

INFANT MORTALITY IN RELATION TO FERTILITY IN UTTAR PRADESH

**(Study Sponsored by the Family Planning Foundation, India and
the International Development Research Centre, Canada)**

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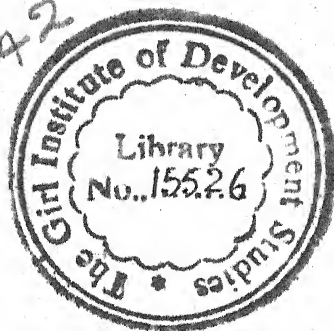
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June 15, 1988

M.S. ASHRAF

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PREFACE

This report, written by my colleague Dr. M.S. Ashraf, Senior Fellow, presents the findings of a study of Infant Mortality in Relation to Fertility in Uttar Pradesh. The study was sponsored by the Family Planning Foundation of India as part of a nationwide survey and was conducted in the rural areas of 5 districts in the plain and 3 districts in the hills of the State in 1987. In all 19,991 households spread over 198 villages in the state were surveyed and covered 5,409 mothers. The main objectives of the study were to identify the determinants of infant mortality and their relative importance and to examine the relationship between infant mortality and fertility.

High rate of infant mortality in the country in general and in Uttar Pradesh in particular is decidedly an important cause of concern, especially in so far as it is a symptom of a poor quality of life. Development, in the ultimate analysis, must have a positive impact on the quality of life of the masses, especially the poor and deprived section of society. As long as high levels of infant mortality persist, the fruits of development will always remain questionable.

The present study undertaken by the Institute will hopefully focus attention not only on the magnitude of the problem in the State of Uttar Pradesh, but also on the factors responsible for it and policy implications for family planning and public health programmes. This report will have served its purpose if it generates a lively discussion and debate among scholars, students of the subject and policy makers.

June 15, 1988

B.K. JOSHI
DIRECTOR

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CHAPTER I

INTRODUCTION

Uttar Pradesh with 1109 lakh persons (1981) has the highest population among the States in India accounting for about one-sixth of total population of the country. In terms of area, it ranks fourth with 2.94 lakh sq. km. The density of population is 377 per sq. km. About 82 per cent of total population of the state lives in rural areas in 1,12,566 villages and about 18 per cent in the 659 urban areas. The sex ratio (number of females per 1000 males) in U.P. is one of the lowest (885) in the country. Its decadal growth rate (1971-81) was 25.49.

According to the census 1981 the literacy rate in the State as a whole was 27.16, 38.76 per cent among males and 14.04 per cent among females. When split between rural and urban areas this literacy rate becomes 23.34 per cent for the population in the rural areas and 45.91 per cent for the population in the urban areas. Literacy among females in the rural areas (9.86%) has been very low as compared to the urban areas (35.82%).

In the year 1985-86 the state had 73,490 junior basic schools, 14,728 senior basic schools and 5,709 higher secondary schools, besides 403 degree colleges and 21 universities. The enrolment of students in these institutions was 119.73, 22.26, 43.24, 3.95 and 1.30 lakhs respectively. Among them the girls students constituted 33.52 per cent in junior basic schools, 24.69 per cent in senior basic schools 24.24 per cent in higher

secondary schools, 21.33 per cent in the degree colleges and 23.12 per cent in the universities. Thus, the proportion of girls was approximately in between one-third and one-fifth of the total enrolment at various stages of education in the state.

There are 22,440 health care units ranging from sub-centres to medical colleges, besides 467 M.T.P. centres and 187 ICDS projects in the state. The number of beneficiaries covered under the M.C.H. and E.P.I. schemes comes to 88.83% of the target for T.T., 108.89% for D.P.T., 102.51% for D.T., 74.58% for Polio, 111.28% for nutritional (for mothers) 105.36% for children, 105.07% for Vitamin 'A' solution, 46.4% for measles, 98.28% for Typhoid and 72.55% for B.C.G. during 1986-87. The coverage under the Family Welfare Programme in the state during 1986-87 shows an impressive performance. The achievements exceeded the targets in respect of sterilisation (by 14.31%), I.U.D. (by 44.39%), c.c. users (by 7.05%), Oral pill users (by 4.05%) and MTP(0.01%) during this period. However, the targets for sterilisation were achieved for the first time during this period, while the targets for IUD were achieved since 1985-86 and for Oral pill users since 1984-85. The couple protection rate of U.P. is still significantly low (25.0 during 1987) as compared to the country as a whole (37.4).

The birth rate, the death rate and the Infant mortality rate in the state have been significantly higher than that of the country. According to the S.R.S. data the B.R., D.R. and I.M.R. for U.P. during 1985 was 37.6,

15.8 and 140 respectively. In comparison, the rates for India during the same period were 32.7, 11.7 and 95 respectively. The average B.R. in U.P. during the last sixteen years, i.e. 1970-1985, was 40.82 as against 34.26 for India, the D.R. 18.77 as compared to 13.93 for India and the IMR. 168 in the state as against 121 for the country as a whole.

In Uttar Pradesh, the low age of girls at marriage (mean 18.3 years) and the high proportion of young age marriages (15-19), son-preference and low literacy rate among females are constraints in fertility reduction. The young age marriages, the fertility behaviour pattern, illiteracy, low socio-economic status, low family planning acceptance and unhygienic conditions in the rural areas and highest proportion of untrained attendants at delivery are some of the significant factors responsible for the higher IMR in the state.

Trends in Infant Mortality in U.P. During the Last Decade

Infant Mortality in Uttar Pradesh has been significantly higher in comparison with the country as a whole. The IMR for U.P. during 1975 was 198 while for India the rate was 140. The IMR for India during 1975 and 1985 has declined consistently to 95 during the year 1985. In the case of Uttar Pradesh it shows a fluctuating tendency: the IMR declines to 168 during 1977, rises to 177 in 1978, declines again during 1979 and 1981 after which it rises again to 147 in 1982 and 155 in 1983.

which, however, remains lower than the IMR during 1978. Since 1984 the trend indicates a decline in the IMR in U.P. The table below indicate: (a) the IMR in the rural areas have been consistantly very high as compared to the urban areas; and, (b) the fluctuations in the IMR for the state of Uttar Pradesh were largely due to fluctuations in the IMR for the rural areas.

Table: 1

Infant Mortality Rate : Uttar Pradesh and India.

Year	Uttar Pradesh			India		
	Rural	Urban	Total	Rural	Urban	Total
1975	---	---	198	---	---	140
1976	184	121	178	139	80	129
1977	174	119	168	140	81	130
1978	184	114	177	137	74	127
1979	168	104	162	130	72	120
1980	167	99	159	124	65	114
1981	157	97	130	119	62	110
1982	156	99	147	114	65	105
1983	166	100	155	114	66	105
1984	165	99	154	113	66	104
1985	152	97	140	105	57	95
Average 1975-85	167	105	163	124	69	116

* Source: Government of India, Ministry of Health and Family Welfare, Department of Family Welfare: Family Welfare Programme in India - Year Book 1983-84, (Based on SRS data) and Registrar General of India : Sample Registration Bulletin, Vol.19, No.2, December 1985.

The average IMR for the period 1975-85 was 163 and 116 for Uttar Pradesh and India respectively. Thus, the IMR in U.P. was higher by 40.52 per cent from the IMR for India. The average Infant Mortality Rate in rural and urban areas of Uttar Pradesh during 1976-85 were higher by 34.67 per cent and 52.17 per cent from the IMR of the two areas of the country respectively. The decline in the IMR in the state was 29.3 per cent in 1985 as compared to 1975, while for the country it was 32.1 per cent. In comparison to the country as a whole the IMR in U.P. has declined at a slower pace and the Infant Mortality Rate in urban Uttar Pradesh has been significantly higher as against the IMR for the urban parts of India. Another significant feature is that the Infant Mortality Rate in U.P. has remained higher than the states of Andhra Pradesh, Assam, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan and Tamil Nadu during 1976-85.

In the absence of district-wise rural-urban Infant Mortality Rates we have confined ourselves to the analysis of IMR at the state level only. The differences in IMR in the rural and urban areas of the state are quite significant. The Infant Mortality Rates in the rural areas have been higher in comparison with that of the urban areas. However, differences in the rural-urban IMRs in the country as a whole have been much wider than that in the state of Uttar Pradesh. For example, the Infant

Mortality Rate in rural areas of U.P. in 1976 was higher by 52.11% from the IMR in the urban areas whereas for the rural India the IMR was higher by 73.75% from that in the urban parts of India. In 1977 the IMR in rural U.P. was higher from the urban areas by 46.22%, in 1978 by 61.40%, in 1979 by 47.37%, in 1980 by 68.59%, in 1981 by 61.86%, in 1982 by 57.58%, in 1983 by 66.0%, in 1984 by 66.57% and in 1985 by 56.7%. In comparison to this, the IMR in the rural areas of the country in 1977 was higher from the urban parts of India by 72.84%, in 1978 by 85.14%, in 1979 by 80.56%, in 1980 by 90.77%, in 1981 by 91.94%, in 1982 by 75.38%, in 1983 by 72.73%, in 1984 by 71.21% and in 1985 by 84.21%. Similarly, the average IMR in rural India during 1976-85 was higher by 79.71 per cent than that of the IMR in the urban areas as against 59.05% in case of the state of Uttar Pradesh.

Earlier Studies on Risk Factors

Correlates:

The knowledge of the determinants of infant mortality is a prerequisite for formulating policies and programmes for the reduction in the incidence of infant mortality. Our understanding in this area is limited. However, we find that poverty is one of the most significant causes of high infant mortality rate as it is related with low level of education of mothers, occupation of

1. The author benefitted greatly from the status study on 'Infant Mortality Research in India', by Gandotra M.M. and Das, Narayan (1984).

fathers and their low income, poor living conditions and malnutrition. Early marriages, short interval between births, lack of sufficient medical facilities and adequate number of trained birth attendants, higher fertility rate, unhealthy environment and certain socio-cultural practices have been found associated with higher infant mortality.

Some of the studies indicating relation between certain socio-economic, cultural and bio-environmental factors and infant mortality are discussed here briefly.

Ruzicka¹ in an urban setting found the educational level of mother and social and economic status of the family, the most effective factors determining the level of infant, neonatal and post-neonatal mortality. The study of Srivastava and Saxena² found the incidence of infant mortality significantly influenced by the caste status, education of mother, occupation and income of the father. The infant mortality was reported to be the lowest when the mother's age at child birth was between 25 and 29 and who were married in the age bracket 20-24. It was further observed that the incidence of infant mortality was lower (i) where the mothers availed regular antenatal care, (ii) when the birth weight of the child increased upto the normal weight of 2.5 kg. and above, and (iii) when the nutrition given to the infant as proxied by feeding index, was higher. Jain³ and Lal⁴ found that family size and malnutrition to mother and infant were important factors associated with infant mortality. Rajpai⁵'s a study indicates that (i) risk of perinatal mortality increases at maternal age of over 25 years and

sharply after 35 years, and, (ii) low birth weight was another major cause of perinatal mortality. Mehdi's⁶ study indicate that the principal biological causes of perinatal death were related to maternal age and parity. The socio-economic conditions and the nutritional status of the mother were also considered as very important factors associated with infant mortality. Arora⁷ found the infant mortality was high when the mothers were in the age group 15-19 years. The study conducted by Battacharya⁸ reveals that Muslims had experienced high infant mortality as compared to Hindus. Among the Hindus, the higher infant mortality was found among socially and economically backward people. The infant mortality was the highest among the agricultural labourers and lowest among the cultivators. Parent's education was found to be negatively associated with the level of infant mortality. Based on hospital records Arora⁹ observed that the infant mortality rates were higher among those infants whose mothers were in the extreme ages of their reproduction viz., 15-19 and 30 years or more. Infant mortality was found to be highest among the first parity mothers, it declined till the third parity and then increased suddenly from parity four or more. Gunasekaran's¹⁰ study also found the highest infant mortality rate when the age of mother was in between 15-19 years. The study also reveals that longer the interval between two births, the lower was the risk of death in infancy. The rates were highest when the interval was less than two years which declined sharply thereafter. The studies by Dandekar¹¹, Saxena,¹² Pandey,¹³ and Gandotra, Das and Dey¹⁴ also support the earlier findings that infant mortality rates were higher when the mothers were young, i.e., upto 19 years. Mohan Singh¹⁵ found that the IMR was higher among low income groups, highest among the families residing

in Kutcha houses and where well-water was used instead of hand pumped-water. The IMR was low in villages with a sub-centre and in the areas where MCH services were available. The study by Gandotra, Das and Dey¹⁵ reveals : (i) the IMR was very high among mothers below the age of 20 years, (ii) the risk of infant mortality was reported to be higher in the first order births and after birth orders 4, (iii) the infant mortality was found to be the highest when the birth interval was less than 18 months and lowest when the spacing between two births was more than 30 months, (iv) the level of education and socio-economic status of couple, calorie and protein intake of the mother were negatively associated with infant mortality.

Besides socio-economic and demographic factors, a number of studies have also attempted to discuss the association of some socio-cultural, nutritional, environmental and other related factors with infant mortality.

Chandrasekhar,¹⁶ on the basis of his study, indicated the role of Dai (birth attendant) who is not aware of even elementary rules of health as an important factor for the high infant mortality in India. The ignorance of average mothers on how to take care of the infants during their infantile ailments plays a significant role in the infant death. Simmons¹⁷ in his study found the village health environment a very important factor related with infant mortality. The significant factors included: previous tetanus in the family, type of birth attendant, existence of large animals and age of the mother, Sundar Rao¹⁸ while summarising the major causes of high infant mortality in India on the basis of the results of several studies finds that (i) IMR was higher when the mother was either very young or relatively older, (ii) the highest risk of mortality

was found among first births and after third births, (iii) the risk of survival of the infant was higher if the interval between births was shorter, (iv) certain customs and habits e.g., branding of the skin, application of cowdung to the cut end of the umbilical cord, frequent purgation, faulty feeding and weaning practices were also associated with high infant mortality, (v) shortage of trained Dais, midwives, health visitors was also an important cause of high infant mortality, (vi) lack of safe drinking water supply, poor housing conditions, bad drainage and insect breeding increases the IMR. Ramachandran¹⁹ observes that ninety per cent of all child deaths could be avoided by safe water and proper sanitation. He estimated about 30 per cent of pregnant women were suffering from acute anaemia in the last stage of pregnancy which was responsible for the high incidence of prematurity, a major factor in infant mortality. Malnutrition has also been found responsible for high incidence of diarrhoea and certain respiratory infection in post-neonatal period among poor communities. Swamy²⁰ found lack of sufficient number of trained birth attendants an important factor in higher IMR. Bhattacharjee²¹ analysed that the states with higher IMR had a low level of literacy and urbanization, relatively lower level of medical services and lower age at marriage for females. While reviewing literature on infant mortality in India Ashok Mitra²² listed the following reasons of high infant mortality .

- (a) malnutrition of mother and child both before and after birth,
- (b) exposure and bad housing, (c) unprotected water and food for the new born, and (d) incompetent assistance, medical or otherwise, at after child birth.

(ii) Determinants:

The causes of mortality during the neonatal and post-neonatal periods may be different. On the basis of the available studies some major causes of infant deaths during these periods are summarised below :

On the basis of data from the Model Registration Scheme in Rural India, Ramabhadran²³ listed the important causes of infant deaths. They were: Broncho-Pneumonia and Pneumonia; diseases peculiar to infancy; prematurity; infection of the new born; dysentery and tetanus. Simmon²⁴ found the major clinical cause of death during the neonatal period was tetanus which accounted for about two-thirds of neonatal deaths. During the post-neonatal period the major causes of mortality were general infections or inflammatory diseases, such as malarial, small pox, diphtheria or fever. Karkal²⁵ found two major causes of infant deaths. They were, congenital malformation and diseases of early infancy. Faujdar's study indicates that infective and parasitic diseases followed by diseases of digestive system disorders and diseases concerning respiratory system were the major causes of infant deaths. It was further observed that among the deaths due to infective and parasitic diseases, almost 50 per cent deaths were due to a single cause tetanus. Jha²⁶ analysed the clinical causes of infant mortality over a period of 20 years. It was observed that in the age group 0-1 year, Pneumonia was a major cause of mortality followed by congenital malformations and birth injuries. Ashok Mitra²⁷ observed that in communities with relatively poor health, sanitary condition and nutrition, infective and parasitic diseases were the most important killers of infants, but if these conditions are brought under control, diseases of

respiratory system and of metabolism and nutrition assume greater significance. The report of the Registrar General²⁸ India identified tetanus as the major cause of infant deaths in rural India followed by prematurity.

Badri found prematurity and respiratory infections as main causes of infant mortality in the neonatal period and diarrhoea and respiratory infections in the post-neonatal period. Bhatia's³⁰ study found that a high percentage of infant deaths were due to causes of perinatal mortality followed by infective and parasitic diseases and diseases of the respiratory system. Swamy³¹ found a high percentage of infant deaths were due to causes peculiar to infancy i.e., prematurity, birth injuries, respiratory infection and diarrhoea. The disorders of the respiratory system was mostly due to pneumonia. The analysis of the causes of infant deaths by Jain³² indicated prevalence of diseases of early infancy, important among which were prematurity and respiratory infections in the rural areas. Convulsion, diarrhoea and malnutrition were found the other important causes. In the urban areas a high incidence of the diseases of early infancy (neonatal) was indicated. Infective, parasitic and respiratory disease were important during the post neonatal period. Pneumonia, enteritis and other diarrhoeal diseases were also found to be the important specific diseases causing infant death.

Gandotra and Des³³ found more than 60 per cent of the deaths during neo-natal period occurring due to infective and parasitic diseases. During the post-neonatal period infective and parasitic diseases were again the main killers of infants. Infants deaths due to diseases of the respiratory system like acute bronchitis and pneumonia were also noted to be high. Sunder Rao³⁴ observed that the

major causes for neonatal mortality were prematurity and congenital malformations. Infections diseases coupled with malnutrition were some of the main causes of high infant deaths during the post-neonatal period. Gandotra and Das³⁵ has summarised the causes of infant deaths that have emerged from various studies, during the neonatal and post-neonatal period. They are:

1. Causes of deaths during the neonatal period include:
 - (a) Certain conditions originating in the perinatal period such as Pre-maturity, infection like tetanus, convulsions, toxemia, birth injuries and low birth weight;
 - (b) diseases of respiratory system such as pneumonia and other respiratory infections;
 - (c) infective and parasitic diseases like diarrhoea; gastro-enteritis etc.;
 - (d) congenital anomalies; and,
 - (e) diseases of central nervous system such as meningitis.
2. Some of the important causes of deaths during the post-neonatal period include:
 - (a) infective and parasitic diseases such as infantile gastro-enteritis, dysentery and other diarrhoeal diseases, bacterial diseases like tetanus and viral diseases such as measles, whooping cough and diphtheria etc.;
 - (b) diseases of respiratory system like Broncho-pneumonia and labour-pneumonia;
 - (c) metabolic diseases especially the protein - calorie malnutrition in association with the respiratory diseases, tuberculosis and parasitic infestation; and

- (d) post-natal Asphyxia and group of conditions associated with pre-maturity.

3. Implications:

In a traditional society like India a large family is considered desirable and a large number of males in the household is considered a source of social and economic strength. Sufficient number of sons are considered to be a means of sustenance during old age. Such socio-cultural attitudes contribute to indifference to birth control ideas and lead to higher fertility which enhances the chances of mortality among infants.

Kulkarni's³⁶ study of twelve states revealed a direct effect of infant mortality on fertility. Kurup³⁷ found a high correlation between infant mortality and birth rate. However, infant mortality rate and birth rate have been found to have high negative correlation with bed-population ratio and per capita expenditure on health services. Das³⁸ found the birth order intervals were associated not only with the death of the previous infant, but death of earlier infants as well. His study revealed the interval between the second and the third births was longest when the first two infants survived and it was shortest when they died before age one. The study of Srivastava and Pandey³⁹ covering over two thousand households in a PHC area of Uttar Pradesh found the infant mortality was 159 per thousand live birth. Their analysis of the interval between two successive births, according to death or survival of the infant and some social and demographic characteristics, revealed that infant mortality reduces the birth interval

considerably, more so when a male infant dies. This was found to be true irrespective of the mothers' age, parity, proportion of children surviving, type of family and caste of the couple. Omran and Standley's⁴⁰ study found that the mean interval between the birth of child when died in infancy and the end of the subsequent pregnancy was shortened by 6 to 8 months as compared to the interval when the child survived the first year of life. Eriksson⁴¹ concluded that the death of an infant induces a desire to replace the lost child thereby motivating the couple to have more number of children than otherwise they would like to have. 'Hence to control this excess fertility it is mandatory that adequate protection is given to the living child.' Talwaker's⁴² study indicated infant mortality as a stronger cause of high fertility than high fertility as a cause of infant mortality.

As regards the impact of fertility on infant mortality a number of studies revealed a higher mortality rate for the first birth than the second and third births. These rates rise sharply from the fourth birth onwards. Khanna's⁴³ study indicated an increased hazard to life by short intervals between births. The study of Das⁴⁴ also supported these findings. He observed that the babies born within short intervals were subjected to comparatively higher mortality, regardless of the order of the birth. The possible reasons of such impact could be that births in rapid succession affects the mother's birth adversely which carried impact on the physical constitution of the new born. On the other hand, mother's capacity to take care of the new born during infancy is reduced. Lack of adequate care by weak mothers and the weak physical constitution of the new born

reduces the chances for his survival. Gandotra, Das and Dey⁴⁵ observed the importance of mother's age and interval between two births for the survival of the child. They found that most of the children survived were those born to mothers in the age group 20-29 and whose pregnancies had been spaced at intervals of at least thirty months or more.

Current Schemes for Health Care in U.P.

The Draft Seventh Five Year Plan of the state of Uttar Pradesh admit that 'On the health-care side, considerable intra-regional and rural urban disparities exist in the relative distribution of medical services..... The comparative picture of the health status of the people of this state as compared to the National average and other States continues to be unfavourable as judged from infant mortality and death rates..... The availability of indoor beds, doctor-population ratio and nurse-population ratio in the state also compares unfavourably..... The main issues in health planning, therefore, are:

- (1) High rate of population growth;
- (2) High mortality rate specially of infants;
- (3) The extent and severity of malnutrition;
- (4) Non-effective control of communicable and non-communicable diseases;
- (5) High incidence of diarrhoeal diseases and other infectious diseases especially among infants and children; and,
- (6) Lack of safe potable drinking water and environmental sanitation!!

Another significant aspect of the shortage of proper health care facilities is that a large number of births are attended by

untrained persons. The SRS data from the Registrar General of India indicate that 94.1 per cent and 93.7 per cent of the total sample births in rural Uttar Pradesh were attended by untrained persons during 1970-72 and 1976-78 respectively as compared to 57.1% and 63.6% at the National level, in the two periods respectively. In the urban areas, against 33.8 per cent and 24.8 per cent at the National level, 54.9 per cent of the sample births during 1970-72 and 40.7 per cent during 1976-78 were attended by untrained persons in Uttar Pradesh.

To attain the National goal of health for all by 2000 A.D., which include among other indicators, reduction in Birth Rate to 21 per 1000, Infant Mortality Rate to less than 60 per 1000 live births and Growth Rate to 1.20 and enhancement in the percentage of couple protection to 60, pregnant Mothers receiving antenatal care to 100 and deliveries by trained birth attendant to 100, the family welfare measures have to be strengthened. Besides, more efforts are required for improving the sanitary and water supply conditions.

In order to improve the health of mothers and children and guard them against a number of serious ailments a number of programmes are in operation in the State. Some of the most important of these programmes are:

1. Maternal and Child Health Programme (M.C.H.)

The services under the M.C.H. Programme could be classified under the four main groups:

- (a) Ante-natal care of pregnant mothers;
- (b) post-natal care of mothers and new born babies;
- (c) safe delivery of children; and,

(d) immunization of children.

Recognising the close relationship between high birth rate and high infant mortality the Seventh Five Year Plan of the state has given high priority to the M.C.H. Programme. Besides, preventive, promotive and educational aspects of the M.C.H. services have been given highest priority. And, health care for mothers and children has been strengthened through the primary health care approach.

2. Integrated Child Development Services (ICDS).

Under this programme the following services are provided to the child population, expectant and lactating mothers of the selected areas in the state:

- (i) Supplementary nutrition;
- (ii) Immunization;
- (iii) Health check-up;
- (iv) Referral services;
- (v) Non-formal education;
- (vi) Nutrition and health education;
- (vii) Supply of safe drinking water.

Under the scheme one project per one lakh population is set-up in the urban as well as rural areas and one project per 35000 population in areas dominated by tribals. The centres set-up under the scheme provide nutritious diet worth 45 paise per normal child, 75 paise per pregnant and nursing women and 95 paise per mal-nourished child per day for 300 days.

The ICDS Projects launched on 2 October 1975 are at present 202 in number in 54 districts of the state. Out of them 22 projects are in the Hill areas. Of the 202 projects, 8 are in the state

sector and 194 in the Central sector. The Cooperative for American Reliefs Everywhere (CARE) is providing nutritional food free of cost in the 49 projects and the World Food Programme (WFP) in the 61 projects in the State. The Government of Norway is providing financial assistance for meeting expenditure on administration and nutritional food in 27 projects of the State.

3. Expanded Programme of Immunization (E.P.I.)

A significant part of high morbidity and mortality among infants and children is attributable to certain common communicable diseases. Efforts are on to prevent them by immunising children and pregnant mothers under the E.P.I. The objective of the E.P.I. Programme during the Seventh Five Year Plan is to reduce the incidence of Diphtheria, Whooping cough, Tetanus, Poliomyelitis, childhood Tuberculosis and Typhoid fever by making vaccination services available to all eligible children and pregnant mothers.

4. Universal Immunization Programme (U.I.P.)

The programme was introduced in the country with the help of the UNICEF in 1985. The main objective of the programme is to protect the infants (0-1 year) against common childhood diseases such as: Tetanus, Polio Myelitis, Tuberculosis, Diphtheria, Whooping and cough and Measles. At present 20 districts of the state are covered under this programme. The target under this programme is to immunize 85% of the total infants and 100% of the pregnant mothers for Tetanus Toxide every year in the districts covered under UIP.

Achievements in Health Care in Uttar Pradesh:

The achievements under the various important programmes

such as Family Welfare, M.C.H., I.P.I. and U.P.I. in the State have been analysed for the period 1980-81 to 1986-87. Between 1980-81 and 1984-85, which was the period of the Sixth Five Year Plan, we find that only 45.62 per cent sterilisations were done against a target of 29.94 lakh; 83.46% of a target of 17.41 lakh I.U.D. was achieved; 51.60% of the target of 3.93 lakh Oral Pill Users was achieved and the achievement exceeded the target for C.C. Users (106.46%). The position from 1985-86 to 1986-87 has improved very significantly when achievements have exceeded the targets (except in case of sterilisations for which the achievement exceeded during 1986-87).

The achievements under the M.C.H. and I.P.I. scheme indicate the number of mothers and children receiving nutritious diet had exceeded the targets of 45.0 lakh each by 9.36 per cent and 4.44 per cent respectively during the period of five years. The Vitamin 'A' solution was given to 62.4 per cent of the target of 126 lakh children. Only 65.3 per cent of a target of 64.2 lakh pregnant mothers were immunized against Tetanus. The target for D.P.T. was 90.2 lakh, for D.T. 77.5 lakh, Polio 36.39 lakh, Typhoid 81.7 lakh and B.C.G. 79.0 lakh. However, the achievements were limited to 50.77%, 71.74%, 61.64%, 36.36% and 85.30% respectively. The achievements for 1985-86 and 1986-87, however, shows a marked improvement.

Sanitation and Water Supply:

For ensuring the health and reduction in the case of infant deaths it is also necessary that all towns and villages should have the facility of hygienic water supply and proper sanitation.

With this in view the United Nations Water Conference, in March 1977, decided that 1981-90 would be known as "International Drinking Water Supply and Sanitation Decade". India accepted the recommendation in Principle. The targets fixed for the decade were (Rural areas),

- (a) Rural Water Supply - 100 per cent of the rural population to be covered with basic minimum need of water supply.
- (b) Rural Sanitation - 25 per cent of the rural population to be covered with sanitary toilets.

A total of 35,505 villages having drinking water problem were identified in the State during 1971-72. By the end of March 1984, 25,956 problem villages were covered and it is estimated that except 750, all the remaining problem villages have been covered by the end of the Sixth Plan.

As regards rural sanitation, some feasible attempts by the Rural Development Department in the shape of construction of drains and paving of village roads at a few places was made. However, no significant effort has been made to improve rural sanitation. The availabilities of such facilities in the villages of the State, thus, remains almost negligible.

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CHAPTER-II

Study Design

The National Health Policy (1983) while reviewing the achievements in the promotion of health status of the people since independence has highlighted the elimination of Smallpox and plague and a decline in mortality from cholera and related diseases and the control of malaria to a considerable extent. It, however, felt that in spite of such impressive progress, the demographic and health picture of the country still continues to remain discouraging. The mortality rates for women, children and infants are still distressingly high. Efforts at raising the nutritional levels of our people have still to bear fruit and the extent and severity of malnutrition continues to be exceptionally high. Communicable and non-communicable diseases have still to be brought under effective control not to talk about eradication. Blindness, Leprosy and Tuberculosis continue to have a high incidence. Only 31 per cent of the rural population has access to potable water supply and 0.5 per cent enjoys basic sanitation. High incidence of diarrhoeal diseases and other preventive and infectious diseases, specially amongst infants and children, lack of safe drinking water and poor environmental sanitation, poverty and ignorance are among the major contributory causes of high incidence of disease and mortality.

Our National Health Policy has set the goal to bring down the infant mortality rate from 106 in 1985 to below 60 by 2000 A.D. The goal can be achieved only if we have an accurate knowledge of the risk factors responsible for infant mortality. The appropriate

intervention strategies can be formulated if we are able to acquire such knowledge. The present study is aimed precisely at this.

Study Design:

The study has been conducted in eight different population groups such as hilly, tribal, rural, urban and slum areas in five states, i.e., Uttar Pradesh, Madhya Pradesh, Karnataka, Orissa and Maharashtra. The research phase of one and a half year has been planned to be followed by the action phase of about equal duration.

The project is a collaborative venture, jointly sponsored by the International Development Research Council, Canada and the Family Planning Foundation, India. The following institutions have conducted the study of different segments of population in the states-

Institute/ Project Leader	Population Group (s)	State
1. Giri Institute of Development Studies, Lucknow (Dr. M.S. Ashraf) and Dr. T.S. Popole)	Hilly and Rural Areas	Uttar-Pradesh
2. National Institute of Health and Family Welfare, New Delhi (Prof. Rita Sapru & Dr. Indira Murali)	Rural Areas with high and low immunization rate.	Madhya Pradesh
3. Population Centre, Bangalore (Dr. P.H. Reddy & Dr. P.J. Bhattacharjee)	Rural and Urban Areas	Karnataka
4. Institute of Tribal Health and Social Sciences, Bhubaneswar (Dr. Almas Ali & Mr. Karunakar Misra)	Tribal Areas	Orissa
5. Bombay University (Dr. Victor S D'Souza)	Slum Areas	Maharashtra

Objectives:

The objective of the study was to understand the various factors contributing to higher risks of mortality among infants so that

strategies can be devised to help accelerate the process of decline in infant mortality. With this in view an attempt has been made to study the social and physical environment, infrastructure, the health facilities, socio-cultural practices and the relationship between infant mortality and fertility. More specifically, the objectives of the study were:

1. to identify determinants of infant mortality in India, to know their mechanism and find out their relative risk with a view to devise the most effective intervention modes in the second phase;
2. to understand various socio-cultural practices followed by the people before, during and after pregnancy which are detrimental to the infant survival and ascertain the logic behind them with a view to manipulate changes in them in the second phase; and
3. to examine the inter-relationship between infant mortality and fertility with a view to devise strategies for reducing them effectively.

APPROACH

The epidemiological risk approach was followed in this study. This approach looks at the frequency of the unwanted outcome such as infant mortality or morbidity in a given population when the risk factor is present or absent to find out absolute, relative and attributable risk which can be reduced or eliminated by appropriate intervention strategies. It helped us to know which individuals, families or groups were more vulnerable to risk factors than others or who were at high risk, and to measure their need for suitable care or appropriate interventions by which the risk can be reduced.

or be eliminated in a definite manner.

This approach integrates both social and medical sciences and looks for the whole spectrum of risk factors which might be affecting infant mortality directly or indirectly, independently or jointly in a cumulative or circular manner. It assumes that risk factors are social, economic, cultural, behavioural, biological and environmental in character, endogenous and exogenous in nature, related to mother and child, family and community, personnel and institutional providing relevant health care services, and operate at various stages of life cycle such as pre-natal, natal and post-natal in a time sequence. The risk factors, grouped into five, were studied. They included: (a) factors connected with experiences of earlier reproductive life; (b) factors affecting risk at the time of conception; (c) factors affecting risk at the time of growth and development of foetus during gestation period; (d) factors affecting risk at the time of delivery of baby; and (e) factors affecting risk at the time of growth and development of the infant.

Mostly retrospective data, both quantitative and qualitative in nature, was collected from communities, health, personnel, households and mothers of children born in the last 2 years (before survey) through focused, directed and indepth interviews using schedules and guidelines in a uniform manner.

Coverage:

The present study covers two population groups, i.e., Hilly and Rural areas of Uttar Pradesh. The districts in the two population groups were selected on the criterion of the highest proportion of

rural population among the districts of the regions of respective areas. However, in the case of rural areas one district, i.e., Etawah, was selected which had the proportion of rural population next to district Mainpuri because our field team faced some serious problems in the later and we apprehended the possibilities of getting unreliable data, besides, being delayed in getting the data. The districts in the Hilly areas included: Tehri Garwal, Pithoragarh and Almora. In sum, therefore, in the rural areas, Rae Bareilly from central U.P., Banda from Bundelkhand region, Etawah from western U.P., Basti and Sultanpur from the Eastern region were selected for our study.

The proportion of rural population in the selected districts, according to 1981 Census, was 95.87% in Tehri Garwal, 94.48% in Pithoragarh and 93.72% in Almora among the Hill population group. In the Rural group Rae Bareilly had 92.63% rural population, Banda 88.20%, Etawah 85.21%, Basti 95.20% and Sultanpur 96.70% of rural population. In the Hilly population group three blocks per district were selected. Out of them two Blocks were non - ICDS and one an ICDS (Integrated Child Development Scheme) Block. In the Rural population group, one ICDS and one non - ICDS Block per district was selected. The selection of the Blocks was also guided by the same criterion, i.e., highest percentage of rural population among the ICDS and non - ICDS categories of Blocks of the selected districts.

The district-wise selected Blocks and their status was as follows :

District	Block	Status
A. Hilly Population		
1. Tehri Garhwal	1. Theoldhar	Non-ICDS
	2. Chambr	Non-ICDS
	3. Jakhnidhar	ICDS
2. Pithoragerh	4. Barinag	Non-ICDS
	2. Bin	Non-ICDS
	3. Gangolighat	ICDS
3. Almora	1. Bhikiyasen	Non-ICDS
	2. Terikhet	Non-ICDS
	3. Bait	ICDS
B. Rural Population		
1. Rae Bareli	1. Saton	Non-ICDS
	2. Barchandpur	ICDS
2. Banda	1. Baberu	Non-ICDS
	2. Bisanda	ICDS
3. Etawah	1. Mehwa	Non-ICDS
	2. Basrhar	ICDS
4. Basti	1. Bahadurpur	Non-ICDS
	2. Khalilabad	ICDS
5. Sultanpur	1. Bhetwa	Non-ICDS
	2. Musafirkhanna	ICDS

SAMPLING

At the first stage three districts, namely, Tehri-garhwal, Almora

and Pithoragarh from the Hilly Population group, and five districts from the plains namely, Sultanpur, Basti, Rae Bareilly, Etawah and Banda for the Rural population group, with the highest rural population in their respective regions were selected. At the second stage, within each district in the Hill area, three blocks (one covered by I.C.D.S. and two others, were selected with the same criterion of highest rural population. Initially, the project design had suggested selection of 10 villages/clusters per block. However, during the course of survey we noticed high fertility and infant mortality rate. The sample was, then, revised to 8 villages/clusters per Block except in the case of Trilokhet Block of district Almorah where 10 villages/clusters had been completed by the time we revised the sample size of villages. In each of the eight villages/clusters 120 households were selected and surveyed. For the study of Rural Population group the number of blocks per district were two (One ICDS and one non-ICDS), the number of villages/clusters per Block was the same as in the Hilly Population group. However, the number of households per village/cluster in the Rural Population group was 150. The schedule III seeking details about the family members was, therefore, administered on 120 households per village/cluster in the Hill and on 150 households per village/cluster in the plains of Uttar Pradesh. On the basis of the household survey the sample of eligible women was drawn. The sample of eligible women whom the child was born in the last two years were drawn thus:

- (a) all women whose children died during infancy,
- (b) every alternate woman whose child survived.

The survey in the Hill areas had a sample of 3,380 households and in the Rural areas 12,000 households in which the sample of mothers was 1,693 and 3,049 respectively. However, one scrutiny, some schedules were rejected. The final sample, thus, constituted of 1,572 mothers of 3,572 households in the Hill areas and 3,837 mothers of 11,419 households of the Rural areas. The total sample, including Hill and Rural areas of Uttar Pradesh, therefore, consisted of 5,409 mothers of 19,991 households of 198 villages (154 clusters of villages) ⁱⁿ 19 Blocks of the eight districts.

SCHEDULES

After selecting the village/cluster in Hilly and Rural areas as per the procedure described earlier the following four schedules were administered on different categories of the sample.

Schedule 1 : (for community i.e., village)

Schedule 2 : (for Health Workers i.e., Dai, ANM, Doctor)

Schedule 3 : (for household in the selected sample)

Schedule 4 : (for mother of child born alive in the last two years).

Schedule 1 was designed to collect basic information about the sample villages such as population, health and educational facilities and available infrastructure. This was canvassed to a cross section of well-informed persons of the village such as the Pradhan, the members of the Panchayat, Co-operatives, teachers of the schools etc.

Schedule 2 was designed to collect basic information from local health workers such as Dai, ANM, Female Health guide, Health visitor and Medical officer dealing with the health problems of women and children and providing MCH and Family planning Services to the people

of the sample villages. The information sought through this Schedule was pertaining to the personal background of the health worker such as : educational and training background, service experience, levels of job satisfaction, tasks performed, knowledge about appropriate MCH services and the level of professional competence among them.

Schedule 3 was designed to list all usual residents in sample households, and collect basic information about them (such as sex, age, educational level, marital status, age at marriage and at Grains), find out number of children born alive so far and in the last two years and the number of those who were surviving and the birth order in case of infant deaths. The information about birth of children was collected from the currently married women with a view to identify and select sample of eligible women to whom schedule 4 was to be canvassed. The schedule III was canvassed either to the head of the household or an elder, responsible and knowledgeable person in case the head of the household was not available.

Schedule 4 was designed to collect detailed information about all socio cultural, environmental and biological risk factors operating during the pre-natal, natal and post-natal stages. The risks also included those arising from socio-economic and physical environment of the household. More specifically, the Schedule sought information about (a) Maternal history, starting from the age at marriage to the outcome of pregnancies including the complications developed during pregnancies; (b) History of Live Births including mother's age at child birth, duration of pregnancy, birth interval, cause of death in case the child did not survive and use of contraceptives;

(c) Pre-natal Risk Factors operating during the period of index pregnancy which included a list of sickness/symptoms, Antenatal Care received, certain personal habits during pregnancy, dietary intake, work and leisure etc; (d) Natal Risk Factors operating at index delivery including conditions during labour and delivery, problems experienced by mother at delivery, complications experienced by child at birth and medical attention received; (e) Post-natal Risk Factors including the age of the child when supplementary foods were introduced, immunization, ailments - their duration and medical treatment given, growth of the child, symptoms of malnutrition in the child and knowledge about usual health problems gained by mothers through mass media; (f) Socio-Economic and Environmental Risk Factors including socio-economic conditions, housing conditions, household income and expenditure etc.

The Schedule IV was canvassed to the women to whom the child was born during the last two years. Since the schedule was prepared in English it was felt during the pretesting that it can create some problems of communication because a number of questions included medical terminology. Besides, due to the association of a large field team in the survey the uniformity in communicating the essence of the question was also needed to be assured. Considering these aspects we translated this schedule into simple and understandable Hindi. This minimized the chances of errors in communication between the investigators and the respondents.

Schedule I and II were canvassed by the field work Supervisors and schedule 3 and 4 by the Investigators. The Supervisor contacted knowledgeable persons of the villages for completing Schedule I and

key health workers for collection information on schedule II. They also established rapport with influential residents of the sample villages for ensuring cooperation from the sample population.

Study Team:

The study team consisted of the following:

Project Director

Coordinators Field Work Supervisors

Data checkers Investigators (Female)

Initially, there were two project Directors. However, one of them, Prof. TS Fapole went on long leave after some time. The project was, therefore, supervised by the other Director. The Project Director, with research experience of about twentyfive years, holding a senior faculty position at the Giri Institute of Development Studies, Lucknow was assisted by a team of two field-work coordinators, eight Supervisors, 77 Investigators and three data checkers.

The two coordinators were post graduates in Social sciences. One of them had experience of about five years in different research projects and the other had about one year experience in research projects and about three years in teaching at graduate level. They were monitoring progress of field work, checking the data collection work in the sample areas, helping the supervisors and investigators in establishing rapport and in solving their problems; verifying a sample of data collected by the Investigators by contacting the interviewed families; and maintaining various records.

The eight supervisors, post-graduates in one or the other social sciences with experience of working in projects ranging from one to about two years were assigned supervision of field work in one district each. In order to ensure proper sampling and reliability of data constant supervision was essential. During the period of survey, therefore, they stayed in the field.

The supervisors were given an intensive training for about a month. During the training, objectives, approaches, sampling procedures, methods of interviewing, coding and verification procedures were explained in detail. A large portion of the period was devoted to discussing the four Interview Schedules, particularly the Schedule IV. Dr. BR Patil, Project Director, Family Planning Foundation, New Delhi, also spent two days with the team. He explained the background, the Schedules and clarified certain points. The supervisors were also engaged in a number of group discussions among themselves. This helped the Project Director to understand the capabilities of each of them. During the course of group discussions two persons were identified as 'weak' and, therefore, were replaced. They also conducted some interviews locally, which were examined and further explained in case lack of clarity about the essence of the questions was noticed.

After the training they were placed in the selected districts where they also identified Field Investigators with the help of the Social Science's Departments of the University/Post-graduate/Degree Colleges/Health Block officials. They also trained Investigators, identified the sample villages, established contacts with the resourceful persons of the area and supervised the data collection.

The training of local Investigators was organised in their districts as none of them was prepared to attend the training at Lucknow. Besides, the Project Director the coordinators also visited these places and helped the supervisors and the Investigators in solving their problems.

We faced serious problems in finding out suitable female Investigators in Lucknow as none wanted to go to remote rural areas for the field work. We, therefore, recruited the female investigators locally, mostly from the selected Blocks. Their number in a district depended on three considerations : (a) the locations of selected villages in the Block; (b) the availability of suitable females who could undertake the job sincerely and complete the survey at the earliest and (c) the number should be manageable. Since the availability of post-graduate females in rural areas was rare the minimum educational qualification for them was kept at B.A. (with atleast one of the Social Sciences). The field work was conducted simultaneously in all the blocks of the selected districts. In all, a total of 77 Field Investigators were engaged in the eight selected districts, 29 in the three Hill districts and 48 in the five districts of plains of Uttar Pradesh. The Investigators were trained for one week to ten days before they started the survey. The Supervisor remained there throughout the period of survey. He helped them when they faced any problem, checked their performance in the field, verified a selected number of interviews and got the interviews redone in case there were serious inaccuracies.

Field Operations.

The primary data was collected from all the eight districts of U.P. between January and June 1987. The data about the births and infant mortality was related to the last two years proceeding the investigation period.

All the investigators who conducted the survey were females as we noted above. But despite scaling down of the recruitment qualifications of female investigators in the blocks chosen for investigation, there was no smooth sailing for us at all the places. The first problem was of finding the sufficient number of graduates with interest in the survey work. At least in two districts we faced the problem seriously. Despite our best efforts through our contacts we could not get female investigators in Mainpuri district. We decided to replace the district by Etawah. In Tehri Garhwal we could not find the female investigators from the selected blocks. However, we succeeded in persuading a group of post-graduate female students of the university to work in the three blocks.

The local investigators were given training for a period of one week to ten days and then placed under the supervisors. The established contacts with the influential persons of the selected villages. The household survey was, then, conducted under constant supervision.

Since a supervisor was to look after the survey of the two/three blocks of the district he used to check a selected number of completed schedules randomly. This helped us in maintaining the reliability of the interviews and the sample. In two districts, i.e.,

Banda and Tehri Garhwal, a number of interviews were cancelled and the sample households reinterviewed. In one village of district Banda the entire lot of completed schedules was rejected after the supervisor suspected that the sampling procedure was not adopted properly by the investigators. The village was resurveyed. In Tehri Garhwal four villages were resurveyed after the coordinators found the checking of the completed schedules was not done properly by the supervisor. They also suspected inaccuracies in sampling. The supervisor for this district was also replaced and a number of investigators were dropped. Thus, precautions were taken ~~for~~ maintaining the reliability of the data. For this purpose, the field operations were kept under constant check. All the completed schedules were checked by the data checkers and coordinators. A sample of them was also checked by the Project Director. The supervisors were constantly given feedback about the quality of the interviews conducted by the investigators of their areas. The Project Director also visited the selected districts during the periods of training of investigators and survey. After observing the field work in each of the districts he used to issue general instructions to all the supervisors so that the inaccuracies/discrepancies observed in one district are avoided in others.

CHAPTER-III

The Profiles

The present chapter deals with the profiles of the selected districts, blocks, villages, health personnel, households and mothers. The profiles of districts and blocks are based on the available secondary data while those of the health personnel, households and mothers are based on the information collected through interviews.

As mentioned in Chapter II, health personnel were interviewed on the basis of an interview schedule. The information sought was connected with the status of the worker, educational background, experience, level of job satisfaction, tasks performed, training received and professional competence.

The households were surveyed through an interview schedule. Generally, the head of the households were interviewed and in their absence the information was sought from the eldest member of the family. The information sought was connected with the size of family, sex and age distribution, educational levels, marital status of the family members, their age at marriage and gauna, children born alive to the married members so far and in the last two years and birth order in case of infant deaths.

The study covered two population groups, i.e. rural and hilly areas of Uttar Pradesh. In all, eight districts were selected (five from the rural and three from the hilly areas) for the collection of the primary data.

The districts were selected on the basis of the proportion of rural population. In the case of the sample of the Rural population group, the five districts, namely, Etawah, Basti, Sultanpur, Rae-Bareilly and Banda were selected because they have the highest proportion of rural population in their respective regions. The three districts chosen from the Hilly population group included Tehri-Garhwal, Almora and Pithoragarh. From each of the district in the Rural group one ICDS and one non-ICDS block and from each of the districts of the Hilly group one ICDS and two non-ICDS blocks were selected for the survey of households.

Districts and Blocks

The profiles of the selected districts and blocks in terms of the population, size, existing health and family welfare and educational infrastructure are presented in Table 1. The district and block-wise data indicate the total population, proportion of the Scheduled Castes/Scheduled Tribes and literates in the total population and the health and family welfare and educational facilities per lakh of population.

Among the Hilly group district Almora had the largest population (7.57 lakhs) but except the number of doctors and Higher Secondary Schools the other health and educational facilities per lakh of population were lesser than those in Pithoragarh which had the lowest population among the three districts (4.89 lakhs). All the three districts had degree colleges and one selected block in each of the district of Pithoragarh and Tehri Garhwal also had degree colleges. Except in case of Para Medical workers, the health

Table 1 : Existing Health and Family Welfare and Educational Infrastructure in Districts and Blocks Covered Under the Study

Districts and Blocks	Popula- tion	SC/ST (%)	Allopathic hospitals		Beds	Doctors	Paramedical workers		MCH Cen- tres, Sub-Cen- tres	Literate Sub-Cen- tres	J.B. School	Sr.B. Hr.Scy./ School Inter	Degree College
			4	5			7	8					
1	2	3	4	5	6	7	8	9	10	11	12	13	
ALORA	757373	20.84	14.79	114.87	21.40	64.99	36.99	37.76	159.62	30.25	20.48	0.66	
Tarikheth	58746	22.80	10.17	40.68	13.56	50.85	32.20	42.01	169.49	30.51	16.95	-	
Bhikiyasan	40545	17.62	20.00	85.00	25.00	75.00	34.00	36.84	187.50	14.00	26.00	-	
Salt	57481	18.02	14.03	45.61	15.79	59.65	36.84	30.28	173.94	31.57	22.80	-	
TEERI GARHWAL	497710	12.78	13.65	70.68	14.06	112.45	29.52	27.89	182.53	34.74	20.08	0.40	
Chamba	45320	8.36	11.11	44.44	13.33	106.67	31.11	30.93	177.78	28.39	22.22	2.22	43
Thouldhar	39665	14.39	10.00	40.00	7.50	97.50	27.50	27.16	167.50	30.00	17.50	-	
Jakhnoidhar	41802	11.74	14.28	57.14	11.90	119.05	28.57	22.22	173.31	23.81	19.05	-	
PIPHORIGARH	489267	22.99	16.77	130.06	16.77	81.39	39.67	39.08	189.16	32.11	19.63	0.82	
Bini (ithoragarh)	43361	23.25	13.95	30.23	16.28	72.09	41.85	46.00	146.41	13.95	9.30	-	
Gangolihat	59812	25.24	13.33	56.67	9.33	55.00	36.67	33.60	156.57	55.00	18.33	-	
Barling	42684	23.24	11.62	52.38	4.76	61.90	35.71	40.03	195.23	33.33	19.04	2.38	
ERINAH	174251	25.41	2.75	30.75	5.27	17.38	16.35	37.29	75.09	20.14	6.83	0.54	
Barbera	140654	24.74	0.71	2.84	1.42	13.47	21.28	30.08	58.35	13.44	4.25	-	
Mahewa	155405	27.93	1.93	9.03	2.58	11.61	14.84	39.45	65.16	20.00	2.58	-	
BASPI	3573069	20.01	2.29	27.95	3.83	51.54	20.12	20.24	60.51	10.28	4.19	0.22	
Behadurpur	103292	24.59	0.97	17.48	2.91	55.40	19.42	21.69	58.33	16.50	4.85	-	
Khalilabad	103840	26.32	0.93	5.55	0.93	7.41	19.44	23.33	62.74	12.96	1.85	-	
BANDA	1533990	23.63	5.02	28.81	6.78	29.99	15.91	23.30	82.79	13.38	3.78	0.33	
Baberu	121278	23.30	2.48	8.26	3.31	27.27	14.83	21.05	84.50	16.53	3.31	-	
Bisanda	111129	29.83	2.70	7.21	4.50	29.73	25.22	17.45	71.17	14.41	0.90	-	
RAJ BARILLI	1823940	29.56	3.76	40.33	5.19	39.80	21.04	23.08	60.31	17.70	3.07	0.37	
Harchandpur	79902	33.94	5.06	25.32	5.06	51.90	26.58	22.23	62.02	18.99	3.80	-	
Bataon	98739	27.67	2.04	10.20	3.06	35.71	22.45	26.19	54.29	18.37	3.06	-	
SULTAN UR	2042778	23.12	2.69	35.73	4.01	38.52	16.74	22.44	78.17	15.08	4.45	0.34	
Musaffirkhona	77909	25.57	-	-	-	38.96	19.23	16.22	76.92	11.54	5.13	-	
Bhetuwa	54382	22.29	3.70	14.81	3.70	55.56	25.93	20.17	87.04	18.52	3.70	-	

Note: Column 2, Population according to Census 1981, Columns 4-8 & 10-13, Facilities per lakh population.

and family welfare facilities in district Tehri Garhwal were lowest population among the three districts.

In the Rural group, we find the number of various health and family welfare and educational facilities per lakh of population were significantly smaller than in the Hilly group. Even the percentage of literates in four of the five districts was considerably lower than the percentage of literates in the Hilly groups. All the districts had degree colleges but none of them was located in any of the selected blocks.

The comparative position of the health facilities per lakh of population in the districts of the two sample population groups was:

Hilly Population Group

Facilities	<u>Number per lakh population</u>		
	<u>Pithoragarh</u>	<u>Almora</u>	<u>Tehri garhwal</u>
Allopathic Hospitals/ Dispensaries	16.77	14.79	13.65
Beds	130.06	114.87	70.68
Doctors	16.77	21.40	14.06
MCH Centres/Sub-Centres	39.67	36.99	29.52
Para Medical Workers	81.39	64.99	112.45

Rural Population Group

Facilities	<u>Number per lakh population</u>				
	<u>Etawah</u>	<u>Basti</u>	<u>Banda</u>	<u>Rae Bareli</u>	<u>Sultanpur</u>
Allopathic Hospital/Dispensaries	2.75	2.29	5.02	3.76	2.69
Beds	30.75	27.95	28.81	40.33	35.73
Doctors	5.25	3.85	6.78	5.19	4.01

Facilities	Etawah Basti Banda Rae Bareli Sultanpur				
ACH Centres/Sub Centres	16.35	20.12	15.91	21.04	16.74
Para Medical Workers	17.38	51.54	29.99	39.80	38.52

Localities

In the ten blocks of five districts a total of 86 villages were surveyed in the sample of Rural population group. In the Hilly population group, 112 villages from nine blocks of three districts were covered. The number of villages in the Hilly areas was larger because, generally, the size of villages was small and, therefore, 120 households could be surveyed from clusters of villages.

In this section we describe the distance between villages and the various health, educational and infrastructural facilities available to the population. We find, (i) the extent of health facilities available within the village in the Hilly and the Rural areas was more or less similar, (ii) all the villages in the Rural areas had a significantly higher proportion of educational facilities within their boundaries than those in the Hilly areas; (iii) a larger proportion of villages in the Hilly areas had more infrastructural facilities within them; and (iv) a larger number of the facilities were available at a shorter distance in the Rural areas than in the Hilly areas. The Table 2 and 3 present the comparative picture of access to health facilities in the selected villages of the Rural and Hilly areas respectively.

We find that the Untrained Dais were available in about three-fourths of the villages while about one-third of the villages had

ANM/Nurse, Health visitor and Trained Dais in the rural area. A smaller proportion of the villages had other health facilities within their boundaries. However, if we consider the distance of upto five kilometre as easily accessible, most of the facilities were within this distance from the selected villages. For example, 39.53 per cent of the villages had an Untrained Dai within 5 Kms., 34.39 per cent of the villages had an ANM/Nurse, 73.75 per cent had an Health Visitor and Sub-Health Centre each, 70.32 per cent had a Trained Dai; 67.43 per cent had a private Allopathic doctor (RMP); 62.78 per cent had a Female Health Guide; 62.79 per cent had a drug store; 58.14 per cent had a private hospital/clinic, and, 56.97 per cent of the villages had a Primary Health Centre within this distance. The other government hospital/clinic was available to 40.71 per cent of the selected villages within 5 Kms. Thus, we find most of the villages surveyed in the Rural areas had access to one or the other kind of health facilities within their reach.

The position of villages in the Hilly areas was somewhat different from the point of view of access to health facilities. This is presented in Table 3.

Only 40.13 per cent of the villages had an ANM/Nurse, 39.29 per cent had an Untrained Dai and 38.39 per cent of the villages had an Health Visitor (ACh/FF) within them. The Trained Dais were available in 27.68 and Female Health Guide in 19.64 per cent of the villages. The other health facilities within the villages were available in small proportion in the selected villages for the study. However, a significantly larger proportion of the villages had a number of health facilities within a distance of 5 Kms.

Table 2 : Distribution of Villages in the Rural Areas and Access to Health Facilities

Facilities	Distance from the Village (in Kms.)						Total
	0	1-2	3-5	6-10	11-15	16-20	
Untrained Dais	66 (75.74)	1 (1.16)	10 (11.63)	9 (10.47)	0 (0.00)	0 (0.00)	86 (100.00)
Trained Dais	26 (30.23)	12 (13.35)	23 (26.74)	19 (22.09)	5 (5.81)	1 (1.16)	86 (100.00)
Female Health Guide	15 (17.44)	16 (18.60)	23 (26.74)	19 (22.09)	10 (11.63)	2 (2.33)	85 (100.00)
A.M. Nurse	31 (36.05)	20 (23.26)	22 (25.58)	10 (11.63)	3 (3.49)	0 (0.00)	86 (100.00)
Health Visitor, MCH, PHC	27 (31.40)	14 (16.25)	25 (29.07)	16 (18.60)	4 (4.65)	0 (0.00)	86 (100.00)
Sub-Health Centre	15 (17.44)	20 (23.26)	31 (36.05)	16 (18.60)	3 (3.49)	1 (1.16)	86 (100.00)
PHC	4 (4.65)	15 (17.44)	30 (34.88)	24 (27.91)	8 (9.30)	5 (5.81)	86 (100.00)
Govt. Hospital Clinic	6 (6.98)	9 (10.47)	20 (23.26)	18 (20.95)	15 (17.44)	7 (8.14)	86 (100.00)
Private Hospital Clinic	14 (16.28)	12 (13.95)	24 (27.91)	23 (26.74)	7 (8.14)	5 (5.81)	86 (100.00)
Drug Store/Pharmacist	9 (10.47)	15 (17.44)	30 (34.88)	18 (20.95)	10 (11.63)	3 (3.49)	86 (100.00)
Private Allopathic Doctor	16 (18.60)	16 (18.60)	26 (30.23)	17 (19.77)	10 (11.63)	1 (1.16)	86 (100.00)

Note : Figures in bracket indicate percentages.

Table 3 : Distribution of Villages in the Hilly Areas and Access to Health Facilities

Facilities	Distance from the Village (in kms)						Total
	0	1-2	3-5	6-10	11-15	16-20	
Untrained Dais	44 (39.29)	19 (16.95)	26 (25.21)	13 (11.51)	4 (3.57)	5 (4.45)	112 (100.00)
Trained Dais	31 (27.68)	18 (16.07)	32 (28.57)	20 (17.85)	6 (5.36)	4 (3.57)	112 (100.00)
Female Health Guide	22 (19.64)	8 (7.14)	28 (25.00)	25 (22.52)	18 (16.07)	8 (7.14)	112 (100.00)
Aid Nurse	45 (40.18)	9 (8.04)	27 (24.11)	21 (18.75)	9 (8.04)	1 (0.89)	112 (100.00)
Health Visitor (MCH/ML)	43 (38.39)	11 (9.82)	24 (21.43)	22 (19.54)	12 (10.71)	0 (0.00)	112 (100.00)
Sub-Health Centre	19 (16.96)	6 (5.36)	31 (27.68)	28 (25.00)	16 (14.29)	7 (6.25)	112 (100.00)
EHC	10 (8.93)	4 (3.57)	30 (26.79)	46 (41.07)	17 (15.18)	3 (2.68)	112 (100.00)
Govt. Hospital/Clinic	9 (8.04)	6 (5.36)	26 (23.21)	39 (34.82)	25 (22.52)	5 (4.46)	112 (100.00)
Ext. Hospital/Clinic	13 (11.61)	5 (4.46)	31 (27.63)	35 (31.25)	27 (24.11)	1 (0.89)	112 (100.00)
Drug Store/Pharmacy	13 (11.61)	9 (8.04)	35 (31.25)	34 (30.36)	21 (18.75)	0 (0.00)	112 (100.00)
Private Allopathic Doctor	17 (15.18)	4 (3.57)	39 (34.82)	38 (33.93)	14 (12.50)	0 (0.00)	112 (100.00)

Note : Figures in the bracket indicate percentages.

For example, the proportion of villages having access to various health facilities within 5 Kms. was 79.46 per cent for Untrained Dais, 72.32 per cent for the Trained Dais, 72.36 per cent for the AN. Nurse, 69.64 per cent for the Health Visitor (MCH FP), 51.78 per cent for the Female Health Guide, 50.90 per cent for the drug store, 50.0 per cent for the Sub-Health Centre, 43.75 per cent for the private hospital/clinic, 53.57 per cent for the private Allopathic doctor (RMP), 39.29 per cent for the PHC, and 36.61 per cent for the other government hospital/clinic.

The comparison of Tables 2 and 3 indicates that (a) except in case of Untrained Dais in the Rural sample a large number of the health facilities were not available within the villages surveyed. Most of the facilities were available outside the selected villages, but within a distance of upto 5 Kms. and, (b) a larger proportion of villages in the rural group had access to such facilities within 5 Kms. than the villages in the Hilly group.

As regards access to the educational facilities, a significantly larger proportion of the villages in Rural group had such institutions within their boundaries than in the Hilly group. The Tables 4 and 5 present the situation with regard to the educational facilities in the two population groups.

A significantly large proportion of villages in the Rural population group had a primary school followed by Anganwadi/Feeding Centre, non-formal educational centre and women's organization within them. Some of the villages which did not have these facilities had them in the nearby villages. If we consider a distance of below one and two Kilometre conveniently accessible to

the population, the majority of the villagers had fairly easy access to these facilities. For example, a primary school was available to all the villages within 2 Kms., 83.72 per cent of the villages had access to an Anganwadi feeding centre, 81.39 per cent had a non-formal educational centre and 56.97 per cent had a women's organization within 2 Kms.

In the Hilly population group the position with regard to access to similar facilities is presented in Table 5. In the sample villages of the Hilly areas we find less than half the villages had access to educational facilities. If we consider a distance of upto 2 Kms. to be the least inconvenient for the population we find 71.43 per cent of the villages had easier access to a primary school, 59.82 per cent had a non-formal educational centre, 58.93 per cent had an Anganwadi/feeding centre and 50.0 per cent a women's organization. Following the criterion, one can add that the educational facilities in the Hilly areas ^{are} not conveniently located, except to some extent, in the case of primary schools. In this sense, therefore, the educational development in these areas has not taken place at par with the development in similar sphere in the Rural areas of the state.

The existence of transport and communication facilities indicate not only the level of development of the area but also the extent of facilities available for establishing contacts outside the village and getting help in case of an emergency. Tables 6 and 7 show the distance between selected villages and the infrastructural facilities in the rural and hilly areas respectively.

Nearly sixty per cent of the villages in the Rural area

Table 4 : Distribution of Villages in Rural Areas and Access to Educational Facilities

Facilities	Distance from the Village (in Kms.)							Total
	0	1-2	3-5	6-10	11-15	16-20	More	
Angarwadi Feeding Centre	66 (76.74)	6 (6.98)	2 (2.23)	7 (8.14)	2 (2.33)	2 (2.33)	1 (1.16)	86 (100.00)
Primary School	73 (34.83)	13 (15.12)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	86 (100.00)
Non-Formal Education Centre	55 (63.95)	15 (17.44)	2 (2.33)	4 (4.65)	5 (5.81)	3 (3.49)	2 (2.33)	86 (100.00)
Women's Organisation	44 (51.16)	5 (5.31)	10 (11.63)	10 (11.63)	6 (6.98)	3 (3.49)	3 (3.30)	86 (100.00)

Note: Figures in the bracket indicate percentage.

Table : 5 Distribution of Villages in the Hilly Area and Access to Educational Facilities

Facilities	Distance from the Village (in Kms.)						Total
	0	1-2	3-5	6-10	11-15	16-20	
Anganwadi Feeding Centre	53 (47.32)	13 (11.51)	8 (7.14)	14 (12.50)	11 (9.82)	3 (2.68)	112 (100.00)
Primary School	52 (46.43)	28 (25.00)	26 (23.21)	6 (5.36)	0 (0.00)	0 (0.00)	112 (100.00)
Non Formal Educational	52 (45.43)	15 (13.39)	24 (21.43)	20 (17.85)	1 (0.89)	0 (0.00)	112 (100.00)
Women's Organization	53 (47.32)	3 (2.68)	27 (24.11)	13 (11.61)	14 (12.50)	1 (0.89)	112 (100.00)

Note : Figures in the bracket indicate percentage.

sample were electrified; 38.37 per cent had motorable road, 23.26 per cent had bus stop, 9.30 per cent had telecommunication office and 3.49 per cent had a Railway station. About three-fourths of the village (76.74 per cent) had motorable road within 2 Kms. and 94.18 per cent within 5 Kms. half of the villages (50.0 per cent) had a bus stop within 2 Kms. and 87.21 per cent within 5 Kms. 12.79 per cent had a Railway Station at a distance of upto 2 Kms. and 33.72 per cent had it within 5 Kms., and 27.90 per cent of the villages had a telecommunication office within 2 Kms. and 61.62 per cent had it within 5 Kms.

The position with regard to infrastructural facilities in the Hilly area sample villages (Table 7) shows that about four-fifths of the villages (81.25 per cent) in the Hilly sample were electrified; 37.50 per cent had telecommunication office, 16.96 per cent had motorable road, and, 11.61 per cent had a bus stop. Over half (54.46 per cent) the selected villages had motorable road within 2 Kms. and 83.92 per cent had it within 5 Kms. 53.57 per cent had a telecommunication office within 2 Kms. and 72.32 per cent had it within 5 Kms., 37.50 per cent had a bus stop within 2 Kms. and 74.11 per cent within 5 Kms., 1.79 per cent had a Railway Station within 2 Kms. and 13.58 per cent within 5 Kms. The comparative position with regard to availability of infrastructural facilities in the two sample population, i.e. Rural and Hilly, shows that (a) a larger proportion of villages in the Hilly areas were electrified and had a telecommunication office than in the Rural areas, (b) the motorable road and a bus stop were not available to a significant proportion of villages in both the sample groups, through the percentage of

Table : 6 Distribution of Villages in Rural Area and Access to Infrastructural Facilities

Facilities	Distance from the Village (in Kms.)							Total
	0	1-2	3-5	6-10	11-15	16-20	More	
Motorable Road	33 (38.37)	33 (38.37)	15 (17.44)	4 (4.55)	1 (1.16)	0 (0.00)	0 (0.00)	86 (100.00)
Bus Stop	20 (23.26)	23 (26.74)	32 (37.21)	9 (10.47)	1 (1.16)	1 (1.16)	0 (0.00)	86 (100.00)
Railway Station	3 (3.49)	8 (9.30)	13 (20.93)	10 (11.63)	16 (18.50)	9 (10.47)	22 (25.53)	86 (100.00)
Tele Communication Office	8 (9.30)	16 (18.60)	29 (33.72)	11 (12.79)	11 (12.79)	3 (3.49)	8 (9.30)	86 (100.00)
Electricity	51 (59.30)	16 (18.60)	15 (17.44)	3 (3.49)	1 (1.16)	0 (0.00)	0 (0.00)	86 (100.00)

Note : Figures in the bracket indicate percentage.

Table 7 : Distribution of Villages in Hilly Areas and Access to Infrastructural Facilities

Facilities	Distance from the Village (in Kms.)						Total	
	0	1-2	3-5	6-10	11-15	16-20		
Motorable Road	19 (16.96)	42 (37.50)	33 (29.46)	11 (9.82)	5 (4.46)	2 (1.79)	0 (0.00)	112 (100.00)
Bus Stop	13 (11.61)	29 (25.89)	41 (36.61)	22 (19.64)	5 (4.46)	2 (1.79)	0 (0.00)	112 (100.00)
Railway Station	0 (0.00)	2 (1.79)	2 (1.79)	1 (0.89)	5 (4.46)	28 (25.00)	74 (66.07)	112 (100.00)
Telecommunication Office	42 (37.50)	19 (16.07)	21 (18.75)	14 (12.50)	9 (8.04)	6 (5.36)	2 (1.79)	112 (100.00)
Electricity	91 (81.25)	13 (11.61)	4 (3.57)	3 (3.68)	1 (0.89)	0 (0.00)	0 (0.00)	112 (100.00)

Note : Figures in the bracket indicate percentage.

villages with these facilities in the Rural sample was higher than in the Hilly sample. A significantly larger proportion of villages in the Rural sample had access to motorable road and bus stops within 2 Kms. than the percentage of villages in the Hilly sample. (c) In the Hilly sample, a larger percentage of villages had the facilities of telecommunication office and electricity within a distance of 2 Kms. than those in the Rural sample.

Health Personnel

In this section we present the profile of selected health personnel who were providing MCH or family planning services to the people of the villages selected for the survey in the Rural and Hilly groups. The profile include distribution of health workers by sex, age, marital status, education, duration of service, tasks involved in job, formal training obtained, competence and level of job satisfaction.

In Table 8 we present the distribution of health workers by sex. Most of the health workers engaged in providing services to the sample villages were females. only 9.23 per cent of them in the Hilly and 5.39 per cent in the Rural sample were males. However, in case of Health Guides in the hills the picture is not identical for the two sample areas the majority of workers (80 per cent in the Hilly are males. In case of Rural areas the percentage is 22.22.

The distribution of health workers by age and marital status is given in Tables 9 and 10. A majority of the Health Visitors and Dais in the Rural areas sample (60.0 and 54.17 per cent respectively) were in the older age group of 40 years and above, while the majority of the Health Guides and a larger percentage of the ANM (40.00 percent)

Table 8 : Categorywise Distribution of Health Workers by Sex

Category	RURAL		MULI	
	Male	Female	Male	Female
Dai	0 (0.00)	24 (100.00)	0 (0.00)	7 (100.00)
Health Guide	2 (22.22)	7 (77.78)	4 (30.00)	1 (20.00)
ANM	0 (0.00)	50 (100.00)	0 (00.00)	32 (100.00)
Health Visitor	2 (5.71)	33 (94.29)	2 (9.52)	19 (90.48)
	4 (3.39)	114 (96.61)	6 (9.23)	59 (90.77)
				57

Note : Figures in the bracket indicate percentage.

Table 9 : Category-wise Distribution of Health Workers in Rural Area by Age and Marital Status

Category	Up to 19 Yrs	20-29 Years	30-39 Years	40 Years	Total Unmarried	Married	Separated	Widow	Total
Dai	1 (4.17)	2 (8.33)	3 (33.33)	13 (54.17)	24 (100.00)	1 (4.17)	1 (4.17)	3 (12.50)	24 (100.00)
Health Guide	0 (.00)	3 (66.67)	3 (33.33)	0 (.00)	9 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)	9 (100.00)
ANM	5 (10.00)	20 (40.00)	18 (36.00)	7 (14.00)	50 (100.00)	3 (6.00)	45 (90.00)	2 (4.00)	50 (100.00)
Health Visitor	6 (.00)	1 (2.86)	13 (37.14)	21 (60.00)	35 (100.00)	0 (0.00)	35 (100.00)	0 (0.00)	35 (100.00)
Total	6 (1.08)	29 (24.58)	42 (35.59)	41 (34.75)	118 (100.00)	4 (3.39)	108 (91.53)	5 (4.24)	118 (100.00)

Note : Figures in the bracket indicate percentage.

were in the younger age group of 20-29 years. However, a significantly larger proportion of the total health workers (70.34 per cent) were in between the late middle and the old age group, i.e. 30 years and above.

An overwhelming majority of the health workers (91.53 per cent) were currently married, which includes all the Health Guides and Health Visitors. Among Dais 10.5 per cent were widows 4.17 per cent were separated/divorced and 4.17 per cent unmarried. Among the ANMs, 4.00 percent were widows and 6.00 percent unmarried.

In the Hilly sample we find more than half of all the health workers were in 30-39 years age group. A majority of health visitors (71.43 per cent) and Health Guides (60.00 per cent) were in the same age group. Over four-fifths of the Dais were equally distributed in the age group of 30-39 and 40 years or more. The ANMs were mostly in the 30-39 and 20-29 years age groups.

Like in the Rural sample, most of the health workers in the Hilly area sample (86.15 per cent) were currently married. Among the Dais 14.29 per cent were widows. One-fifth of the Health Guides, 12.50 per cent of the ANMs and 9.52 per cent of the Health Visitors were unmarried at the time of the survey. The distribution of health workers in the Hilly area by age and marital status is presented in Table 10.

In Tables 11 and 12 we present the educational background and duration of service of the health workers in the Rural and the Hilly areas respectively.

Most of the Dais (87.50 per cent) in the Rural area were illiterate. A majority of the other health workers had passed

Table 10 : Category-wise Distribution of Health Workers in Killy Area by Age and Marital Status

Category	AGE				Total	Unmarried	MARITAL STATUS			
	Up to 19 Yrs.	20-29 Years	30-39 Years	40+ Years			Married	Separated/Divorced	Widow Total	
Dai	1 (14.25)	0 (0.00)	3 (42.86)	34 (42.86)	7 (100.00)	0 (0.00)	5 (85.71)	0 (0.00)	1 (14.29)	7 (100.00)
Health Guide	0 (0.00)	2 (40.00)	3 (60.00)	0 (0.00)	5 (100.00)	1 (20.00)	4 (80.00)	0 (0.00)	0 (0.00)	5 (100.00)
ATH	2 (5.25)	11 (54.32)	15 (46.88)	4 (12.10)	32 (100.00)	4 (12.50)	27 (84.38)	0 (0.00)	1 (3.13)	32 (100.00)
Health Visitor	1 (4.76)	0 (0.00)	15 (71.43)	5 (23.81)	21 (100.00)	2 (9.52)	19 (90.48)	0 (0.00)	0 (0.00)	21 (100.00)
Total	4 (5.15)	13 (20.00)	36 (55.38)	12 (18.46)	65 (100.00)	7 (10.77)	56 (86.15)	0 (0.00)	2 (3.08)	65 (100.00)

Note : Figures in the bracket indicate percentage.

Table : 11 Categorywise Distribution of Health Workers in Rural Area
by Education and Duration of Service

Category	Education		Duration of Service						
	Illiterate	Primary	Primary to Matric	Graduate & Above	Total	Upto 5 Yrs.	6-10 Years	10-15 Years	More Years
Dai	21 (37.50)	1 (4.17)	1 (4.17)	0	24 (100.00)	5 (20.83)	5 (20.83)	11 (45.83)	3 (12.50)
Health Guide	0 (0.00)	1 (11.11)	2 (22.22)	0	9 (100.00)	6 (66.67)	1 (11.11)	1 (11.11)	9 (100.00)
A N M	0 (0.00)	1 (2.00)	7 (14.00)	7	50 (100.00)	29 (58.00)	15 (30.00)	2 (4.00)	4 (8.00)
Health Visitor	0 (0.00)	0 (0.00)	3 (8.57)	3	35 (100.00)	9 (25.71)	6 (17.14)	3 (8.57)	17 (48.57)
Total	21 (17.87)	3 (2.54)	13 (11.02)	10 (8.47)	118 (100.00)	49 (41.53)	27 (22.88)	17 (14.41)	25 (21.19)

Note : Figures in the bracket indicate percentage.

Note : Figures in the bracket indicate percentage.

Table 12 : Categorywise Distribution of Health Workers in Hilly Areas
by Education and Duration of Service

Category	Education			Duration of Service				
	Illiterate	Primary	Primary to Matric	Matric to Graduate	Total	Upto 5 Yrs.	6-10 Years	10-15 Years
Lai	1 (14.29)	2 (28.57)	3 (42.86)	1 (14.29)	7 (100.00)	1 (14.29)	2 (28.57)	4 (57.14)
Health Guide	0 (0.00)	0 (0.00)	0 (0.00)	4 (80.00)	4 (100.00)	1 (25.00)	2 (50.00)	1 (25.00)
ANM	2 (6.25)	0 (0.00)	6 (18.75)	24 (75.00)	32 (100.00)	21 (65.63)	5 (15.63)	6 (18.75)
Health Visitor	1 (4.76)	0 (0.00)	0 (0.00)	20 (95.24)	21 (100.00)	4 (19.05)	2 (9.52)	15 (70.48)
Total	4 (5.12)	2 (3.08)	9 (13.85)	49 (75.38)	65 (100.00)	27 (41.54)	17 (25.15)	21 (32.31)

Note : Figures in the bracket indicate percentage.

High School/Intermediate. About one-fifths of the Health Guides (22.22 per cent) and 14.00 per cent of the ANMs were educated below the Matric level. About one-tenths of the health guides had not completed the primary level education. Among the ANMs 14.00 per cent were Graduates.

A larger proportion of the health workers (41.53 per cent, had been in service for a shorter period of upto 5 years and only about one-fifths of the total workers were in this job for over 15 years. A majority of the Health Guides (66.67 per cent) and ANMs (58.0 per cent) had been in service for upto 5 years while 45.83 per cent of Dais had spent between 10 and 15 years in this service. Nearly half of the Health Visitors had spent more than 15 years in their present job.

In comparison to the Rural area sample a smaller proportion of the total health workers in the Hilly area sample were illiterate. Unlike in the Rural area most of the Dais in the Hilly area were literate. The minimum level of education of Health Guides was Matric/Intermediate. A larger proportion of the ANMs and Health Visitors had education of upto High School/Intermediate level. However, a few illiterate ANMs and Health Visitors were also found there.

A larger proportion of the total health workers (41.54 per cent) were in their present job for a shorter duration, i.e. upto 5 years which is followed by those who spent between 6-10 and 10-15 years. The category-wise distribution indicate a majority of the ANMs (65.63 per cent) were in their job for a period of upto 5 years, while a larger proportion of the health visitors (42.86 per cent),

Health Guides (40.00 per cent), and Dais (42.86 per cent) had spent 10 to 15 years.

Training and Competence

The study also explored the tasks performed and formal training received by the Health workers. This was done to understand whether the Health workers had received adequate training in handling such tasks or they were handling their jobs on trial and error basis.

In Tables 13 and 14 we present the proportion of different levels of the Health workers who had formal training connected with their tasks.

Two significant points emerge from the data pertaining to the rural area sample presented in Table 13. (i) Most of the Dais were not formally trained for the tasks they were handling, (ii) Among the other three categories of health workers the largest proportion of ANM/Nurses were formally trained for the tasks they were handling, followed by the Health Visitors & Health Guides.

The competence in handling different tasks acquired through formal training by the various categories of health workers in the Hilly population group was similar to the pattern in the Rural group. The data is presented in Table 14.

In Table 15 we present the data on professional competence of the health workers. It is based on their responses indicating their competence or otherwise in dealing with a number of critical situations.

The situations mentioned in Table 15 are based on questions relating to different situations of risks for mothers and children.

Table 13 : Formal Training Obtained by Different Categories of Health Workers for Handling the Tasks Involved in Their Jobs.

Tasks Performed	(Rural Population Group)			
	Training Obtained			
	Dist (N=24)	Health (N=9)	ANM/ Nurse (N=50)	Health Visitor (N=35)
Detection of Simple Diseases and Malnutrition	7 (29.17)	8 (88.89)	48 (96.00)	34 (97.14)
Identification of High Risk Mothers and Infants	11 (45.83)	7 (77.78)	49 (98.00)	34 (97.14)
Performing Simple Deliveries	15 (62.50)	7 (77.78)	50 (100.00)	34 (97.14)
Referral of Complicated Cases	6 (25.00)	3 (33.33)	40 (80.00)	31 (88.57)
Immunization of Mothers and Infants	7 (29.17)	8 (88.89)	49 (98.00)	34 (97.14)
Simple Treatment of Main Infection like Diarrhoea (DRT)	5 (20.83)	7 (77.78)	47 (94.00)	34 (97.14)
Growth Monitoring	7 (29.17)	8 (88.89)	49 (98.00)	34 (97.14)
Propagation of Breast and Supplementary Feeding	3 (12.50)	8 (88.89)	50 (100.00)	35 (100.00)
Propagation of Personal and Environmental Hygiene	5 (20.83)	9 (100.00)	49 (98.00)	34 (97.14)
Propagation of Birth Spacing and birth control	5 (20.83)	8 (88.89)	49 (98.00)	34 (97.14)
Others	2 (8.33)	3 (33.33)	30 (60.00)	31 (88.57)

Note : Figures in the bracket indicate percentage.

Table 14 : Formal Training Obtained by Different Categories of Health Workers for Handling the Tasks Involved in Their Jobs.

Tasks Performed	(Silly Population Group)			
	Training Obtained			
	Dai (N=7)	Health Guide (N=5)	Nurse/ ANM (N=32)	Health Visitor (N=21)
Detection of Simple Diseases and Malnutrition	2 (28.57)	4 (80.00)	28 (87.50)	18 (85.71)
Identification of High Risk Mothers and Infants	1 (14.29)	2 (40.00)	30 (93.75)	18 (85.71)
Performing Simple Deliveries	2 (28.29)	1 (20.00)	29 (90.63)	18 (85.71)
Referral of Complicated Cases	3 (42.86)	1 (20.00)	29 (90.63)	18 (85.71)
Immunization of Mothers and Infants	1 (14.29)	1 (20.00)	29 (90.63)	18 (85.71)
Simple Treatment of Main Infection like Diarrhoea (DRI)	2 (28.57)	3 (60.00)	29 (90.63)	18 (85.71)
Growth Monitoring	1 (14.29)	4 (80.00)	30 (93.75)	18 (85.71)
Propagation of Breast, Supplementary Feeding	2 (28.57)	4 (80.00)	29 (90.63)	18 (85.71)
Propagation of Personal and Environmental Hygiene	1 (14.29)	3 (60.00)	27 (84.38)	18 (85.71)
Propagation of Birth spacing and birth control	2 (28.57)	5 (100.00)	29 (90.63)	18 (85.71)
Others	1 (14.29)	0 (0.00)	17 (53.13)	18 (85.71)

Note : Figures in the bracket indicate percentage.

The competence of the health workers was judged from the answers they provided. The Table 15 indicates the number of the health workers who provided correct answers to the questions : (i) what type of pregnant women is considered as 'at risk' who need extra precaution and prompt referral? (ii) If a woman pregnant for the second time is in labour for about 36 hours, which course of action would you take? (iii) How many tetanus toxoid injections should initially be given to a pregnant woman? (iv) If a child does not breath immediately after birth, what should be done? (v) If the weight of the child at 2 months was 3.0 Kgs. and again at 4 months is 3.0 Kgs, is it normal or abnormal? (vi) At what age the child should be given BCG vaccine? (vii) At what age the child should be given the semi-solid food? (viii) What ingredients in different proportions are used in the oral rehydration solution (ORS) that can be prepared at home in order to treat diarrhoea. (ix) At what age the child should be given DPT doses? (x) How many doses of tripple antigen/DPT are necessary for the child during the first year? (xi) Should child be fed during an attack of diarrhoea.

The responses of the different categories of the health workers indicate : (a) A large majority of the all categories of health workers could not provide correct answers to the situations listed in the Table 15 at Sl.No. 2, 4, 6, 7, 8, 10 and 11, in both the Rural and the Hilly groups. (b) The Health Guides seems to have lesser competence than even some of the Dais, as none of them could provide correct answer to the Questions 2, 4, 6, 8, and 10; and (c) Even among the ANM and the Health Visitors, none could provide correct response to some of the questions relating to various situations. They lack knowledge of the ingredients of ORS and the

Table 15 : Category-wise Distribution of Health Workers by Correct Responses to Critical Situations

Situation	Correct Responses			
	RURAL		HILLY	
	Dai Health Guide (N=24)	AMV Health Visitor (N=50)	Dai Health Visitor (N=35)	Health AMV Visitor (N=32)
Women at Risk	12 (50.00)	7 (77.78)	45 (90.00)	33 (94.29)
Mother in Labour	0 (0.00)	0 (0.00)	1 (2.86)	6 (85.71)
Doses of Tetanus Toxide	15 (62.50)	7 (77.78)	49 (93.00)	34 (97.14)
Child Breathing Problem Just After Birth	1 (4.17)	0 (0.00)	1 (2.86)	1 (14.29)
Growth in Weight of Child	11 (45.83)	5 (55.56)	40 (80.00)	24 (68.57)
Age at BCG Vaccination	1 (4.17)	0 (0.00)	1 (2.00)	0 (0.00)
Age for Semi-solid Food	8 (33.33)	2 (22.22)	23 (46.00)	12 (34.29)
Ingredients of ORJ	0 (0.00)	0 (0.00)	1 (2.86)	1 (14.29)
Age for DPT doses	8 (33.33)	7 (77.78)	31 (62.00)	17 (48.57)
No. of DPT/Tripplle Antigen Doses during first year	1 (4.17)	0 (0.00)	3 (6.00)	1 (2.86)
Feeding During Diarrhoea	6 (25.00)	6 (66.67)	17 (34.00)	4 (11.43)
			3 (42.86)	1 (20.00)
				13 (40.63)
				1 (4.76)

Note : Figures in the bracket indicate percentage.

number of DTP/Tripplle antigen doses during the first year respectively.

Job satisfaction

The study also explored the level of job satisfaction among the health workers. The responses are presented in Tables 16 and 17, for the Rural and Hilly groups respectively. Questions were asked in relation to the job, remuneration, equipments, supply of medicines, cooperation they receive from the people, junior health workers and the senior health workers

We find most of the Health Visitors and Nurses in the Rural area were fully satisfied with their jobs. A large majority of the Health Guides were fully satisfied with their job, with the supply of medicines, cooperation from people and also with their seniors. A majority of the Dais were fully satisfied with their job, remuneration and cooperation from the people.

In the Hilly population group, most of the health visitors were fully satisfied with their jobs. A large majority of the Nurses and Health Guides were fully satisfied with the supply of medicines, cooperation from the people, from their juniors and their seniors. About half of the Nurses were also fully satisfied with their remuneration and the supply of equipments. Except in case of job, the majority of the Dais were not fully satisfied in other respect. In both the population groups, most of the Health Visitors were fully satisfied with their jobs and related conditions followed by the ANMs/Nurses, Health Guides and the Dais.

Table 16 : Categorywise Distribution of Health Workers by Level of Job Satisfaction (Rural Population Group)

Item	Level of Satisfaction									
	Dai		Health Guide		A N D		Health Visitor			
	No	Yes	No	Some	No	Some	No	Some	Yes	Yes
1. Job	1	9	1	2	6	0	7	43	0	1
	(4.17)	(37.50)	(11.11)	(22.22)	(66.67)	(00.00)	(14.00)	(36.00)	(00.00)	(2.86)
2. Remuneration	1	14	1	4	4	1	12	37	0	34
	(4.17)	(37.50)	(11.11)	(44.44)	(44.44)	(22.22)	(24.00)	(74.00)	(00.00)	(97.14)
3. Equipments	12	4	2	3	3	1	9	40	1	33
	(50.00)	(16.67)	(22.22)	(33.33)	(44.44)	(22.22)	(18.00)	(80.00)	(2.86)	(94.29)
4. Supply of Medicines	12	7	0	3	6	2	9	39	0	32
	(50.00)	(29.17)	(00.00)	(33.33)	(66.67)	(4.00)	(18.00)	(78.00)	(0.00)	(91.43)
5. Cooperation from people	3	5	1	1	7	2	6	42	0	33
	(12.50)	(20.83)	(11.11)	(11.11)	(77.78)	(4.00)	(12.00)	(84.00)	(0.00)	(97.14)
6. Cooperation from Juniors	12	2	1	4	4	4	4	42	0	35
	(50.00)	(8.33)	(11.11)	(44.44)	(44.44)	(8.00)	(8.00)	(84.00)	(0.00)	(100.00)
7. Cooperation from Seniors	11	2	1	2	6	1	4	45	0	35
	(45.83)	(8.33)	(11.11)	(22.22)	(66.67)	(2.00)	(8.00)	(90.00)	(0.00)	(100.00)

Note : Figures in the bracket indicate percentage.

Table 17 : Categorywise Distribution of Health Workers by Level of Job Satisfaction
(Hilly Population Group).

Item	Level of Satisfaction									
	Dai		Health Guide		A N M		Health Visitor			
	No	Yes	No	Some	Yes	No	Some	Yes	No	Some
1. Job	1 (14.29)	4 (57.14)	2 (40.00)	2 (40.00)	1 (20.00)	3 (9.58)	14 (43.75)	15 (46.88)	3 (14.29)	0 (0.00)
2. Remuneration	4 (57.14)	3 (42.86)	1 (20.00)	2 (40.00)	2 (40.00)	6 (18.75)	9 (28.13)	17 (53.13)	3 (14.29)	0 (0.00)
3. Equipments	4 (57.14)	3 (42.86)	1 (20.00)	2 (40.00)	2 (40.00)	6 (18.75)	9 (28.13)	17 (53.13)	3 (14.29)	0 (0.00)
4. Supply of Medicines	4 (57.14)	3 (42.86)	2 (40.00)	0 (0.00)	3 (60.00)	5 (15.63)	3 (9.38)	24 (75.00)	3 (14.29)	0 (0.00)
5. Cooperation from People	2 (28.57)	3 (42.86)	1 (20.00)	1 (20.00)	3 (60.00)	4 (12.50)	3 (9.38)	25 (78.13)	2 (9.52)	1 (4.76)
6. Cooperation from Juniors	4 (57.14)	3 (42.86)	2 (40.00)	0 (0.00)	3 (60.00)	5 (15.63)	3 (9.38)	24 (75.00)	2 (9.52)	1 (4.76)
7. Cooperation from Seniors	4 (57.14)	3 (42.86)	2 (40.00)	0 (0.00)	3 (60.00)	4 (12.50)	3 (9.38)	25 (78.13)	3 (14.29)	0 (0.00)

Note : Figures in the bracket indicate percentage.

Households

The present study covered a total of 19,931 households in the two samples of the Rural (11,419) and the Hilly (8,572) population groups. The total number of persons in these households was 1,08,024 (Male 57,822 and Female 50,202), out of which 65,489 were in Rural (Male 35,587 and Female 29,902) and 42,535 in the Hilly (Male 22,235 and Female 20,300) group. The average size of the household in the Rural group was larger (5.74) as compared to the family size in the Hilly (4.96) group. The average size of the household in the combined sample of the Rural and the Hilly groups was 5.40.

The sex and age-wise distribution of the population in the sample households belonging to the Rural and the Hilly groups is presented in Tables 18 and 19 respectively.

The total population in the selected households consisted of 54.34 per cent of males and 45.66 per cent of females in the Rural and 52.27 per cent of males and 47.73 per cent of females in the Hilly group. Among them 55.3 per cent of males and 73.7 per cent of females in the Rural and 31.5 per cent of males and 57.1 per cent of females in the Hilly group were illiterate. Nearly half (48.04 per cent) of males and 19.7 per cent of females in the Hilly and 24.3 per cent of males and 10.1 per cent of females in the Rural group had received formal schooling at different levels. Another significant feature of the data pertaining to the Rural group is that the government policy of the universalization of basic education in the 6-14 years age group has not made much impact on the child population as 40.7 per cent of male and 54.0 per cent of female children in the 6-15 years age group were not attending school.

Table 18 : Sex and Age wise Distribution of Household members in the Rural Area
by Education

Education	1 Years		1-5 Years		6-15 Years		16-25 Years	
	Male	Female	Male	Female	Male	Female	Male	Female
Illiterate	100.00	100.00	96.69	96.63	40.69	54.00	29.20	58.67
Literate	0.00	0.00	3.31	3.37	59.31	32.97	20.93	19.41
Primary Middle	0.00	0.00	0.00	0.00	18.18	12.01	26.56	13.93
Matric Inter	0.00	0.00	0.00	0.00	1.34	1.03	18.71	6.36
Graduate	0.00	0.00	0.00	0.00	0.00	0.00	4.54	1.12
Total	1078	1012	6104	5489	8980	6312	5316	5534
Percentage	3.03	3.38	17.16	13.36	24.96	21.11	16.34	18.51

Table 18(Contd.)

Education	26-35 Years		36-45 Years		Above 45 Years		Total	
	Male	Female	Male	Female	Male	Female	Male	Female
Illiterate	40.44	69.95	56.35	83.34	72.62	89.83	55.33	73.72
Literate	18.37	17.32	18.25	10.58	14.10	7.09	20.41	16.17
Primary/Middle	20.55	8.33	13.83	3.25	8.29	1.45	14.76	7.14
Matric/Inter	14.05	3.47	6.95	2.44	3.25	1.31	7.01	2.51
Graduate	6.59	0.92	4.12	0.39	1.73	0.31	2.50	0.45
Total	6128	5555	3710	3110	3871	2891	35587	29902
Percentage	17.22	18.58	10.43	10.40	10.38	9.57	100.00	100.00

Table 19 : Sex and Age-wise Distribution of Household Members in the Hilly Area
by Education

Education	1 Year		1-5 Years		6-15 Years		16-25 Years	
	Male	Female	Male	Female	Male	Female	Male	Female
Illiterate	100.00	100.00	95.72	93.29	16.70	26.96	7.24	33.42
Literate	0.00	0.00	6.29	6.71	50.35	48.51	13.10	25.25
Primary-Middle	0.00	0.00	0.00	0.00	30.00	23.31	33.80	25.78
Matric Inter	0.00	0.00	0.00	0.00	2.45	1.34	37.30	12.79
Graduate	0.00	0.00	0.00	0.00	0.00	0.00	3.57	2.76
Total	725	610	2894	2563	5174	4560	4062	4174
Percentage	3.25	3.00	13.02	12.63	23.27	22.47	18.27	20.56

Table 19 (Contd.)

Education	26-35 Years		36-45 Years		Above 45 Years		Total	
	Male	Female	Male	Female	Male	Female	Male	Female
Illiterate	11.28	52.96	18.91	74.10	46.93	92.50	31.51	57.10
Literate	15.34	24.16	20.30	13.47	23.74	4.69	23.45	23.20
Primary/Middle	27.30	14.54	30.96	9.00	19.38	2.36	23.87	14.32
Matric/Inter	30.95	5.66	24.57	2.94	8.42	0.37	16.43	4.28
Graduate	14.14	2.68	5.26	0.50	1.54	0.07	7.74	1.09
Total	3777	3514	2300	2212	3303	2667	22235	20500
Percentage	16.99	17.31	10.34	10.90	14.95	13.14	100.00	100.00

More females than males in both the population groups were (Rural Male 45.6 per cent, Female 52.2 per cent and Hilly Male 42.1 per cent, Female 48.2 per cent) married. The data is presented in Tables 20 and 21 for the Rural and the Hilly population groups respectively.

We find more people in the 6-15 years age group in the Rural areas were married than in the Hilly areas sample. We also find a trend of late marriage among males in both the population groups. In the 16-25 years age group a very high proportion of females (Rural 84.8 per cent, Hilly 67.4 per cent) were married than the proportion of males in the same age group (Rural 57.7 per cent and Hilly 27.3 per cent).

In Table 22 we present the age-wise distribution of married women and their age at marriage. We find a very large proportion of women in the Rural group were married (58.3 per cent, at the early age of upto 15 years. In comparison only 17.2 per cent of the women in the Hilly group were married during this age. However, a majority of women in the Hilly group (55.7 per cent) were married during their age of 16 to 18 years. In the Rural group, 23.2 per cent of women were married during this age.

The Table 23 presents the distribution of married women by their age at marriage and consummation. We find the age at consummation of majority of married women was the same as that of the age at their marriage. However, in the Rural group, the period of consummation of only about half of the women married at the age of upto 15 years was the same while that of about 42 per cent of such women was at the age group of 16-18 years.

Table 20 : Sex and Age-wise Distribution of Household Members in the Rural Areas by Marital Status

Marital Status	1 Year		1-5 Years		6-15 Years		16-25 Years	
	Male	Female	Male	Female	Male	Female	Male	Female
Unmarried	100.00	100.00	100.00	100.00	94.55	92.77	41.82	14.47
Married	0.00	0.00	0.00	0.00	5.24	7.07	57.70	84.82
Separated, Divorced	0.00	0.00	0.00	0.00	0.06	0.02	0.22	0.25
Widow	0.00	0.00	0.00	0.00	0.06	0.14	0.26	0.45
Total	1078	1012	6127	5505	8357	6295	5816	5534
Percentage	3.03	3.38	17.22	18.41	24.89	21.05	16.34	18.51

Table 20 (Contd.)

Marital Status	26-35 Years		36-45 Years		Above 45 Years		Total	
	Male	Female	Male	Female	Male	Female	Male	Female
Unmarried	3.67	1.44	2.45	1.54	3.93	5.08	51.95	44.92
Married	95.28	97.19	94.31	94.15	79.49	73.78	45.62	52.77
Separated	0.29	0.32	0.27	0.29	0.26	0.07	0.16	0.15
Divorced								
Widow	0.75	1.04	2.96	4.02	16.33	21.07	2.27	2.76
Total	5128	5555	3710	3110	3871	2891	35537	29902
Percentage	17.22	18.58	10.43	10.40	10.38	9.67	100.00	100.00

Table 21 : Sex and Age-wise Distribution of Household members in the Hill Area by Marital Status

Marital Status	1 Year		1-5 Years		5-15 Years		15-25 Years	
	Male	Female	Male	Female	Male	Female	Male	Female
Unmarried	100.00	100.00	100.00	100.00	99.45	98.87	72.43	31.94
Married	0.00	0.00	0.00	0.00	0.47	0.97	27.28	57.42
Separated	0.00	0.00	0.00	0.00	0.02	0.00	0.10	0.26
Divorced								
Widow	0.00	0.00	0.00	0.00	0.06	0.15	0.20	0.38
Total	725	610	2945	2597	5123	4526	4062	4174
Percentage	3.26	3.00	13.24	12.79	23.04	22.30	18.27	20.56

Table 21 (Contd.)

Marital Status	26-35 Years		36-45 Years		Above 45 Years		Total	
	Male	Female	Male	Female	Male	Female	Male	Female
Unmarried	3.10	2.65	3.35	2.53	7.11	7.76	55.43	46.16
Married	90.84	94.93	94.09	89.29	79.65	60.70	42.09	48.22
Separated/ Divorced	0.19	0.63	0.39	0.36	0.15	0.04	0.12	0.21
Widow	0.87	1.79	2.17	7.82	13.08	31.50	2.37	5.41
Total	3777	3514	2300	2212	3303	2567	22235	20300
Percentage	16.99	17.31	10.34	10.30	14.85	13.14	100.00	100.00

Table 22 : Age-wise Distribution of Married Women by Age at Marriage

Age at Marriage	RURAL					URBAN					TOTAL							
	Upto 15 Yrs.	16-25 Years	26-35 Years	36-45 Years	Above 45Yrs.	Total	Upto 15 Yrs.	16-25 Years	26-35 Years	36-45 Years	Above 45Yrs.	Total	Upto 15 Yrs.	16-25 Years	26-35 Years	36-45 Years	Above 45Yrs.	Total
Upto 15 Years	100.00	65.59	67.25	69.13	75.38	68.29	100.00	12.09	15.69	15.33	30.16	17.16	100.00	12.09	15.69	15.33	30.16	17.16
16 - 18 Years	0.00	26.33	23.94	21.98	16.08	23.22	0.00	58.38	57.98	57.76	46.45	55.71	0.00	58.38	57.98	57.76	46.45	55.71
19 - 25 Years	0.00	3.07	8.63	8.53	3.33	8.32	0.00	29.53	27.75	25.20	21.82	26.49	0.00	29.53	27.75	25.20	21.82	26.49
26 - 35 Years	0.00	0.00	0.18	0.36	0.14	0.15	0.00	0.00	0.57	0.71	1.52	0.53	0.00	0.00	0.57	0.71	1.52	0.53
36 - 45 Years	0.00	0.00	0.00	0.00	0.07	0.01	0.00	0.00	0.00	0.00	0.06	0.01	0.00	0.00	0.00	0.00	0.06	0.01
Above 45 Years	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	445	5976	4995	2475	1393	13284	44	2465	3163	1984	1774	3430	44	2465	3163	1984	1774	3430
Percentage	3.35	29.93	37.60	18.63	10.49	100.00	0.47	25.14	33.54	21.04	18.01	100.00	0.47	25.14	33.54	21.04	18.01	100.00

Table 23. Distribution of Married Women by their Age at Marriage and Consumption

Age at Marriage	RURAL						HILLY							
	Upto 15Yrs.	16-18 Years	19-25 Years	26-35 Years	36-45 Years	Above 45Yrs.	Total	Upto 15Yrs.	16-18 Years	19-25 Years	26-35 Years	36-45 Years	Above 45Yrs.	
Upto 15 Years	51.48	41.77	6.29	0.03	0.02	0.00	63.29	98.75	0.59	0.56	0.00	0.00	0.00	16.74
16 - 18 Years	0.00	71.14	28.83	0.03	0.00	0.00	23.22	0.00	99.90	0.10	0.00	0.00	0.00	56.34
19 - 25 Years	0.00	0.00	98.32	1.68	0.00	0.00	8.32	0.00	0.00	99.96	0.04	0.00	0.00	26.33
26 - 35 Years	0.00	0.00	0.00	95.00	5.00	0.00	0.16	0.00	0.00	0.00	100.00	0.00	0.00	0.58
36 - 45 Years	0.00	0.00	0.00	0.00	100.00	0.00	0.01	0.00	0.00	0.00	0.00	100.00	0.00	0.01
Above 45 Years	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	35.35	45.06	19.23	0.34	0.01	0.00	100.00	16.53	55.37	26.49	0.61	0.01	0.00	100.00

In Tables 24 and 25 we present the distribution of children born alive to currently married women so far and in the last two years by survival status. The trend indicate (a) more male children were born in both the Rural and the Hilly groups (b) a larger proportion of the male children born so far survived as against the proportion of female children; and (c) in the last two years, however, a slightly larger proportion of the female children survived than the male children.

The Table 26 present the distribution of households by their family size in the two population groups. We find about one-third of the households in the Rural area (35.22 per cent) had upto four members, 51.47 per cent had between 5 and 7 members and 15.31 per cent had eight or more members. In the hilly group, on the other hand, a higher proportion of the families (46.51 per cent) had upto four members, 42.94 per cent had between 5 and 7 members and 10.55 per cent had eight or more members. Thus, a larger proportion of the families in the Hilly group were comparatively smaller as against the families in the Rural group.

Mothers

A total of 3,837 mothers in the Rural and 1,572 in the Hilly population group who have had birth during the last two years were interviewed in detail. Here, we present the profile of the interviewed mothers.

We find a tendency of early marriage in the Rural area as compared to the Hilly area (Table 27). For example, 64.8 per cent of them were married during the age group of upto 15 years as

Table 24 : Sexwise Distribution of Children Born Alive to Currently Married Women so far and in the last Two Years by Survival Status in Rural Areas

Children Born Alive	Total Born		Surviving		Not Surviving	
	Male	Female	Male	Female	Male	Female
So-far	20502	15224	91.29	88.32	8.71	11.68
	57.51	42.49				
In Last 2 Years	3530	3263	35.55	35.87	14.45	14.13
	51.97	48.03				

Table 25 : Sexwise Distribution of Children Born Alive to Currently Married Women so far and in the last Two Years by Survival Status in Hill Areas

Children Born Alive	Total Born		Surviving		Not Surviving	
	Male	Female	Male	Female	Male	Female
So-far	12574	9382				
	57.27	42.73	97.20	96.91	2.80	3.09
In Last 2 Years	1670	1407				
	54.27	45.73	88.44	88.56	11.56	11.44

Table 26 : Distribution of Households by Family Size (Number of members)

Size	Rural Household		Hilly Household	
	Number	Percent	Number	Percent
1	103	0.95	301	3.51
2	502	4.40	590	6.88
3	1204	10.54	1343	15.67
4	1979	17.33	1753	20.45
5	2386	20.89	1738	20.28
6	2043	17.93	1190	13.88
7	1444	12.65	753	8.78
8	790	6.92	404	4.71
9	435	3.81	208	2.43
10	523	4.58	292	3.41
Total	11419	100.00	8572	100.00

against 13.1 per cent in the Hilly area; 24.19 per cent were married in between 15-18 years^{es} against 58.0 per cent in the Hilly group; and 10.8 per cent were married in between 19-25 years age as against 23.6 per cent in the Hilly group.

The Table 28 presents the distribution of respondents by age at consummation. We find that (i) the age at consummation of about one-third of women in the Rural (33.4 per cent, and 14.5 per cent in the Hilly area was upto 15 years; of the 46.4 per cent in the Rural and 55.8 per cent in the Hilly was between 16 and 18 years; and, of the 20.0 per cent in the Rural and 28.3 per cent in the Hilly area between 19-25 years; (ii) the women in the youngest age group of upto 15 years had consummation during the same period while the age at consummation of a larger proportion of mothers at present in the lower middle or the higher middle age groups was, 16-18 years.

The Table 29 describes the distribution of mothers by their age at first pregnancy and present age. The data indicate that a majority of the women in both the Rural (57.5 per cent and the Hilly (69.1 per cent) areas had their first pregnancy during the age group 19-25 years while 31.9 per cent in the Rural and 22.8 per cent in the Hilly areas had their first pregnancy during 16-18 years of age. Another significant feature we find is that a large majority of those at present in the younger age group, i.e., upto 15 years and 16-18 years had their first pregnancy during the same age group period.

The Table 30 presents the data pertaining to the sex-wise distribution of live births experienced by women so-far by birth order. We find : (a) the percentage of children who died increases

Table 27 Distribution of Respondents by Age at Marriage by Present Age

Age at Marriage	RURAL						HILLY							
	Upto 15 Yrs.	16-18 Yrs.	19-25 Yrs.	26-35 Yrs.	36-45 Yrs.	Above 45 Yrs.	Total	Upto 15 Yrs.	16-18 Yrs.	19-25 Yrs.	26-35 Yrs.	36-45 Yrs.	Above 45 Yrs.	Total
Upto 15 Yrs.	0.40	3.36	39.15	47.03	9.41	0.15	64.84	0.49	3.25	45.63	40.29	4.85	0.49	13.10
16 - 18 Yrs.	0.22	1.94	47.41	43.32	6.79	0.32	24.19	0.33	1.76	50.27	39.19	7.90	0.55	57.95
19 - 25 Yrs.	0.24	0.00	41.79	47.10	10.39	0.48	10.79	0.67	0.00	52.78	40.53	5.79	0.22	23.56
26 - 35 Yrs.	0.00	0.00	0.00	75.00	25.00	0.00	0.10	0.00	0.00	0.00	83.33	16.67	0.00	0.38
36 - 45 Yrs.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Above 45 Yrs.	0.00	0.00	0.00	0.00	0.00	100.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.26	3.02	40.08	46.13	8.89	0.31	100.00	0.06	2.29	50.38	39.39	6.93	0.45	100.00

Table 28 : Distribution of Respondents by Age at Consumption and Present Age

Age at Consumption	PRESENT AGE													
	RURAL							HILLY						
	Upto 15Yrs.	16-18 Yrs.	19-25 Yrs.	26-35 Yrs.	36-45 Yrs.	Above 45Yrs.	Total	Upto 15Yrs.	16-18 Yrs.	19-25 Yrs.	26-35 Yrs.	36-45 Yrs.	Above Total 45Yrs.	
Upto 15 Yrs.	100.00	61.54	32.49	33.03	28.45	22.22	33.39	100.00	47.22	13.53	14.04	12.84	12.50	
16 - 18 Yrs.	0.00	38.46	48.11	46.56	41.64	33.33	46.39	0.00	52.78	56.64	55.98	64.22	62.50	
19 - 25 Yrs.	0.00	0.00	19.40	20.12	29.62	44.44	20.07	0.00	0.00	29.84	29.35	22.02	12.50	
26 - 35 Yrs.	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.64	0.92	0.00	
36 - 45 Yrs.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	
Above 45 Yrs.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Total	10	116	1588	1770	341	12	3837	1	36	792	627	109	7	
Percentage	0.26	3.02	40.08	46.13	8.89	0.31	100.00	0.06	2.29	50.38	39.87	6.93	0.45	

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Table 29 : Distribution of Respondents by Age at Pregnancy and Present Age

Age at Pregnancy	RURAL						PRESENT AGE							
	Upto 15Yrs.	16-18 Yrs.	19-25 Yrs.	26-35 Yrs.	36-45 Yrs.	Above 45Yrs.	Total	Upto 15Yrs.	16-18 Yrs.	19-25 Yrs.	25-35 Yrs.	36-45 Yrs.	Above 45Yrs.	Total
Upto 15 Yrs.	100.00	20.66	6.00	4.61	3.23	0.00	5.63	100.00	12.50	2.91	3.43	0.92	0.00	3.24
16 - 18 Yrs.	0.00	79.34	40.43	24.59	14.37	9.33	32.87	0.00	87.50	27.34	16.93	5.50	12.50	22.77
19 - 25 Yrs.	0.00	0.00	53.57	63.53	65.98	33.33	57.49	0.00	0.00	69.75	71.99	63.81	62.50	69.08
26 - 35 Yrs.	0.00	0.00	0.00	7.26	16.42	33.33	4.93	0.00	0.00	0.00	7.59	23.85	12.50	4.77
36 - 45 Yrs.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.92	0.00	0.06
Above 45 Yrs.	0.00	0.00	0.00	0.00	0.00	25.00	0.08	0.00	0.00	0.00	0.00	0.00	12.50	0.06
Total	10	116	1588	1770	341	12	3837	1	32	790	632	109	8	1572
Percentage	0.26	3.02	40.08	46.13	8.89	0.31	100.00	0.06	2.29	50.38	39.87	6.93	0.45	100.00

Table 30 : Sexwise Distribution of Live Births Experienced by Women
So far Birth Order

Birth Order	RURAL				HILLY							
	Living		Dead		Living		Dead					
	Male	Female	Male	Female	Male	Female	Male	Female				
1.	87.19	39.62	12.81	10.38	35.47	31.78	93.59	94.47	6.41	5.53	44.54	38.65
2.	87.99	37.94	12.01	12.06	26.66	26.17	91.84	93.88	8.16	6.12	26.53	29.55
3.	82.91	84.49	17.09	15.51	17.28	18.93	89.57	91.52	10.43	8.48	16.04	18.09
4.	81.89	32.96	18.11	17.04	10.09	11.76	89.57	89.61	10.43	10.39	7.73	8.44
5.	81.60	79.41	18.40	20.59	5.09	6.19	86.89	91.30	13.11	8.70	3.00	3.78
6.	79.75	71.23	20.25	28.77	2.47	2.96	85.29	80.00	14.71	20.00	1.67	1.10
7.	84.06	73.91	15.94	26.09	1.08	1.40	100.00	100.00	0.00	0.00	0.34	0.27
8.	76.47	75.00	23.53	24.00	0.53	0.51	100.00	100.00	0.00	0.00	0.05	0.11
9.	85.71	73.33	14.29	26.67	0.33	0.30	100.00	0.00	0.00	0.00	0.10	0.00
10.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	85.57	85.91	14.43	14.09	100.00	100.00	91.93	93.09	8.07	6.91	100.00	100.00

almost consistently with the increase in the birth order of upto six, and (b) the proportion of male children who died was higher than the proportion of female deaths upto 5th order births in both the Rural and the Hilly groups. The percentage of the female children who died at the 6th order birth was significantly higher than the percentage of male children died this birth order.

The Tables 31 and 32 indicate the distribution of child deaths experienced by women so far by age, sex and birth order. We find that a majority of deaths (male and female both) upto the 2nd order births in the Rural and among the 1st order births in the Hilly area were experienced during the neo-natal stage of the dead children. The proportion of post neo-natal deaths from the 3rd order births in the Rural and from the 2nd order births in the Hilly was significantly higher than the proportion of neo-natal deaths.

The Tables 33 and 34 present sex-wise distribution of child deaths by birth order and causes in the Rural and the Hilly population groups respectively. The highest proportion of deaths in the Rural areas were reported due to Tetanus (Male 28.68, Female 28.45) followed by Pneumonia (Male 15.58, Female 17.96). The proportion of the children who died due to Tetanus was higher in the first to third order births, while the incidence of death due to pneumonia was very high at the 7th order births.

In the Hilly population group, about 47 per cent of males and 45 per cent of female children did not suffer from any of the listed ailments as against about 18 per cent of male and 11 per cent of female children in the Rural group. In the Hilly population

Table 31 : Distribution of Child Death Experienced by Women so far by Age, Sex and Birth Order in Rural Areas

Birth Order	Upto 1 Month		1-12 Months		1-2 Years		2-5 Years		Above 5 Yrs.		Total	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
1.	59.53	55.21	31.44	36.20	5.35	6.13	2.34	1.84	1.34	0.61	32.36	23.42
2.	57.07	53.21	32.00	35.90	7.80	8.33	1.95	1.92	0.98	0.64	22.19	22.41
3.	43.39	37.24	41.80	46.90	12.17	11.03	1.06	4.83	1.59	0.00	20.45	20.83
4.	41.88	38.38	47.01	53.54	9.40	7.07	0.85	0.00	0.85	1.01	12.66	14.22
5.	33.33	34.92	51.67	52.38	15.00	12.70	0.00	0.00	0.00	0.00	6.49	9.05
6.	46.88	35.71	43.75	47.62	6.25	14.29	3.13	2.38	0.00	0.00	3.46	6.03
7.	36.36	33.33	63.64	61.11	0.00	5.56	0.00	0.00	0.00	0.00	1.19	2.59
8.	37.50	16.67	50.00	50.00	12.50	16.67	0.00	16.67	0.00	0.00	0.87	0.86
9.	33.33	50.00	33.33	50.00	33.33	0.00	0.00	0.00	0.00	0.00	0.32	0.57
10.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	50.76	44.68	37.99	43.82	8.55	8.91	1.62	2.16	1.08	0.43	100.00	100.00

Table 32 : Distribution of Child Deaths Experienced by Women so far by Age, Sex and Birth Order in Hill Areas

Birth Order	Upto 1 Month		1-12 Months		1-2 Years		2-5 Years		Above 5 Yrs.		Total	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
1.	60.34	58.97	36.21	28.21	1.72	10.26	0.00	0.00	1.72	2.56	35.37	30.95
2.	38.64	30.30	47.73	60.61	11.36	6.06	2.27	3.03	0.00	0.00	26.83	26.19
3.	38.24	42.86	55.88	53.57	5.88	3.57	0.00	0.00	0.00	0.00	20.73	22.22
4.	33.33	37.50	53.33	50.00	13.33	12.50	0.00	0.00	0.00	0.00	9.15	12.70
5.	25.00	33.33	62.50	50.00	0.00	16.67	12.50	0.00	0.00	0.00	4.88	4.76
6.	40.00	25.00	40.00	75.00	0.00	0.00	20.00	0.00	0.00	0.00	3.05	5.17
7.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	45.12	42.86	46.34	47.62	6.10	7.94	1.83	0.79	0.61	0.79	100.00	100.00

Table 33 : Sexwise Distribution of Child Deaths by Birth Order and Causes in the Rural Group
(in Percentages)*

Cause of Deaths	BIRTH ORDER														TOTAL	
	1 Male	1 Female	2 Male	2 Female	3 Male	3 Female	4 Male	4 Female	5 Male	5 Female	6 Male	6 Female	7 Male	7 Female	Male	Female
Not applicable	25.08	15.95	23.41	11.54	10.58	10.34	8.55	9.09	8.33	7.94	18.75	4.76	0.00	3.57	17.75	10.92
Malaria	5.02	5.52	5.37	1.92	3.70	2.76	2.56	6.06	6.67	0.00	9.38	2.38	0.00	0.60	4.65	3.30
Typhoid	1.67	3.66	1.95	3.21	6.88	2.07	5.98	4.04	6.67	1.59	0.00	2.38	9.09	7.14	3.79	3.16
Pneumonia	16.72	14.11	12.20	17.95	14.81	17.24	16.24	19.19	11.67	19.05	12.50	21.43	50.00	32.14	15.58	17.96
Diarrhoea	2.01	4.91	5.37	2.56	4.76	6.90	6.84	5.04	1.67	9.52	0.00	7.14	0.00	0.00	3.79	5.32
Dysentery	2.01	0.61	1.46	2.56	1.06	0.00	2.56	3.03	6.67	3.17	0.00	0.00	4.55	3.57	2.06	1.58
Paralysis	0.33	1.84	0.98	2.56	1.59	2.76	0.00	1.01	0.00	1.59	3.13	2.38	0.00	0.00	0.76	2.01
Anaemia	1.67	2.45	3.90	5.77	3.70	6.21	0.85	1.01	5.00	4.76	0.00	4.76	4.55	0.00	2.71	4.02
Tetanus	28.09	33.13	28.78	30.77	31.22	26.21	29.06	23.23	28.33	26.98	28.13	26.19	13.64	25.00	28.68	28.45
Jaundice	2.01	4.29	3.90	2.56	2.65	5.52	4.27	1.01	3.33	3.17	6.25	0.00	4.55	7.14	3.14	3.45
Measles	2.68	2.45	4.88	6.41	3.70	2.76	4.27	11.11	15.00	1.59	15.63	9.52	4.55	7.14	4.87	5.17
Malnutrition	2.68	1.84	1.95	1.28	3.70	2.76	2.56	0.00	1.67	3.17	3.13	0.00	0.00	3.57	2.60	1.72
Total	299	163	205	156	189	145	117	99	60	63	32	42	22	28	924	696
Percentage	32.36	23.42	22.19	22.41	20.45	20.83	12.60	14.22	6.49	9.05	3.46	6.03	2.38	4.02	100.00	100.00

- * Note : 1. Only those cause have been reported which account for at least 2% for child deaths (either male or female).
2. The Causes such as Asthma, Gastroenteritis, Acute Abdomen, Peptic ulcer, Heart attack, Accident or injury are accounted between 1-2 percent.
3. The Causes such as Influenza, Bronchitis, whooping Cough, Tuberculosis, Convulsion, Meningitis, Diabetes are accounted below 1%.
4. The total relates to all reported deaths in different birth orders.

group Malaria was reported as a cause of death of 9.8 per cent of male and 15.1 per cent of female children followed by dysentery in the case of 7.9% of males; Typhoid in the case of 7.1% of female children while 6.7 per cent of male and 6.4 per cent of female children were reportedly died of Tetanus.

The incidence of death due to Malaria in the 1st order births was significantly higher among males while among the 2nd, 3rd and 5th order births females were affected most. Typhoid as a cause of death was found considerably higher among females in the 4th order births and among males in the 5th order births. Dysentery caused death to a higher proportion of males in the 3rd, 5th and 6th order births while a high proportion of females of the 5th order births died due to it. Tetanus proved fatal to a significantly higher proportion of male children of the 3rd order births and to a larger percentage of female children of the 4th and 5th order births.

CHAPTER IV

The Risk Factors

The present chapter analyses the contribution of a number of risk or causative factors to infant mortality. These factors are : Pre-natal risk factors, Natal risk factors, Post-natal risk factors, Socio-economic risk factors and Fertility behaviour. In the first three categories of risk factors are: Birth order, Term of pregnancy, Sex of child, Preceding birth interval, preceding birth complications, Maternal diseases during pregnancy, Maternal malnutrition, Workload during pregnancy, Maternal habits during pregnancy, Maternal diet during pregnancy, Medical attention received by the mother, Anti-natal care received by the mother, Immunisation received by the mother, Duration of labour, Type of labour, Type of presentation, Place of delivery, Type of birth attendance, Complications at delivery experienced by the mother, Complications at delivery experienced by the child, Pre-lacteal, breast and supplementary feeding given to the child, Health check-up and immunisation given to the child, Health status of the child and Medical attention received and Growth status of the child.

Among the socio-economic risk factors are : social and educational background, housing conditions including garbage disposal, water drainage, source and type of

drinking water available and cooking fuel, household assets, household income and expenditure. The relationship between fertility behaviour and infant mortality has also been examined. The variables included in this analysis are : fertility status, attitudes about ideal spacing between children, ideal number of children and replacement for the dead child, and, family planning intentions.

Infant Mortality in Uttar Pradesh

As stated earlier, we studied the trends of infant mortality in the two population groups, i.e., Rural and Hilly areas, of Uttar Pradesh. We find a significantly higher infant mortality rate in the rural population group (213.92) than in the Hilly population group (141.25). The Tables 1 and 1-A gives the district-wise and sex-wise Mortality Rates. The salient points are the following :

- (a) a higher IMR among males as compared to the females in the Rural group while it is almost equal in the Hilly group;
- (b) Mortality Rate at the Post-Neo-natal stage in both the population groups was significantly higher than at the Neo-natal stage;
- (c) IMR among female children was lower than the males at the Neo-natal stage in both areas but it was significantly higher than Males at the post-Neo-natal stage, again in both areas.
- (d) Mortality Rate among the toddler group was very significantly lower than the IMR. But, when compared between regions it was higher in the Rural population group than in the Hilly.

Table 1 : District-wise and Sex-wise Mortality Rates at Different Stages in the Rural Population Group

District	MORTALITY RATE							
	Neo-Natal		Post-Neo-Natal		Infant		Toddler	
	Male	Female	Male	Female	Male	Female	Male	Female
Banda	63.64	60.00	124.24	108.00	137.88	168.00	35.92	41.03
Basti	122.97	99.38	60.32	93.17	183.29	192.55	15.94	33.77
Sultanpur	71.86	92.68	221.56	204.88	293.41	297.56	33.56	50.36
Rai Bareli	138.46	89.18	133.33	155.60	271.79	244.78	41.04	51.81
Etawah	50.85	21.74	67.80	21.74	118.64	43.48	20.41	11.36
Total	104.14	80.44	114.79	127.60	218.93	208.04	29.11	37.41

Table 1-A : District-wise and Sex-wise Mortality Rates at Different Stages in the Hilly Population Group

District	MORTALITY RATE							
	Neo-Natal		Post Neo-Natal		Infant		Toddler	
	Male	Female	Male	Female	Male	Female	Male	Female
Pithoragarh	112.73	84.07	80.00	101.77	192.73	185.84	20.13	21.28
Almora	41.96	42.74	27.97	8.55	69.93	51.28	11.90	11.32
Tehri Garhwal	47.62	70.18	121.21	134.50	168.83	204.68	34.88	43.82
Total	68.18	64.98	73.23	76.07	141.41	141.05	22.49	25.57

The highest Infant Mortality Rate was found in one of the two districts from the Eastern region of the State, namely, Sultanpur. The district recorded an IMR of 295.70 (293.41 for males and 297.56 for females) followed by 258.99 in district Rae Bareilly of the Central U.P., 187.25 in district Basti of the Eastern U.P., 179.31 in district Banda of the Bundelkhand region and 85.71 in Etawah of the Western region. The IMR for male children was significantly higher in Rae Bareilly, Etawah and Banda districts while for females it was found higher in both the eastern districts of the state.

In the Hilly group the highest IMR was recorded in district Pithoragarh (189.62) followed by Tehri Garhwal (184.08) and Almora (61.54). The IMR for females was significantly higher in Tehri Garhwal while the IMR among males was found higher in the remaining two Hilly districts.

PRE-NATAL RISK FACTORS

Mothers' Age at Child Birth:

In this section, we have analysed the relationship between certain maternal attributes and infant mortality. We find that the Infant Mortality Rate was highest when the mothers' age at child birth was only upto 18 years (281.77 in Rural and 163.64 in Hilly group), while it was lowest (194.58 in Rural and 123.9 in Hilly group), when they were

in the age group 19-25 years. In the Rural population group, the IMR increased sharply when the mothers were in the age group of between 26-35 (225.34) or above 35 years (224.67) at child birth. In the Hilly population group, the IMR increased sharply when the mothers were in the 26-35 years age group (165.35) at child birth. Thereafter, the IMR declined considerably to 126.76. In the Rural group, a larger proportion of infant deaths were reported at the post-Neo-natal stage than at the Neo-natal stage. Among them in all the age groups of mothers at child birth, female mortality rate was higher than the mortality rate for the male children. In the Hilly Group, Neo-natal mortality was higher when the mothers were in the age group of upto 18 years at the time of child birth. In the other three age groups, i.e. 19-25, 26-35 and above 35 years the position was different and the proportions of deaths at the post Neo-natal stage were higher than the Neo-natal stage. Except in the cases when mothers were in between 19-25 years at child birth, the mortality rate for female children was higher than that of the males.

Table 2 : Mothers' Age at Child Birth and Infant Mortality Rate

Mother's Age (Years)	MORTALITY RATE							
	RURAL				HILLY			
	Neo-natal	Post Neo-natal	Infant	Toddler	Neo-natal	Post Neo-natal	Infant	Toddler
Upto 18	127.07	154.70	281.77	17.70	90.91	72.73	163.64	28.04
19 - 25	94.24	100.34	194.58	30.05	58.82	65.08	123.90	21.69
26 - 35	92.22	133.12	225.34	32.89	78.74	86.61	165.35	21.42
Above 35	66.08	158.59	224.67	55.87	42.25	84.51	126.76	46.88

Birth Order and Births Interval

The relationship between birth order and infant mortality in the Rural group indicate the lowest IMR at second order birth (149.69). The IMR increases very significantly to 241.72 from the third order births which records 243.24 at fourth birth order. In the fifth order births, however, the IMR declined sharply to 228.73.

In the Hilly group, the IMR was lowest in the first order birth (104.97). It increased from the second order (131.71) to the third order birth (196.97), declined at the fourth (157.14) and rose again to the highest IMR (210.53) at the fifth order birth.

Table 3 : Birth Order and Infant Mortality Rate

Birth Order	MORTALITY RATE							
	RURAL				HILLY			
	Neo-Natal	Post Neo-Natal	Infant	Toddler	Neo-Natal	Post Neo-Natal	Infant	Toddler
1	106.50	124.48	230.98	23.40	66.30	38.67	104.97	19.80
2	71.70	77.99	149.69	24.59	48.78	82.93	131.71	23.62
3	109.27	132.45	241.72	38.24	87.12	109.85	196.97	17.05
4	91.48	151.77	243.24	39.05	64.29	92.86	157.14	40.82
5	90.74	138.00	228.73	47.31	92.11	118.42	210.53	36.50

The interval between two births seems to have some relationship with the infant mortality in the Rural population group. However, in the Hilly population group the relationship was inconsistent. In the Rural group, we find that the shortest gap between two births was related to highest infant mortality rate. In the Hilly group the lowest IMR was found when the preceding birth interval was shortest which is in our case upto 24 months. The IMR was highest when the interval was in between 25-36 months. However it declined in the interval period of above 36 months.

Table 4 : Preceding Birth Interval and Infant Mortality

Birth interval (months)	MORTALITY RATE							
	RURAL				HILLY			
	Neo-Natal	Post Neo-Natal	Infant	Toddler	Neo-Natal	Post Neo-Natal	Infant	Toddler
Upto 24	110.60	137.33	247.93	26.78	57.63	50.85	108.47	20.59
25 - 36	98.16	138.65	236.81	37.04	108.79	96.23	205.02	41.01
Above 36	72.77	94.85	167.62	35.09	57.95	87.75	145.70	19.26

Complicated Pregnancies

The IMR had a positive relationship with the complications experienced by mothers during their pregnancies. The IMR in such a case was particularly very high in the Hilly group. Another significant aspect is that in such cases the risk at the Neo-natal stage was much higher than at the post-neo-natal stage.

Table 5 : Complicated Pregnancies and Infant Mortality

Complications experienced	MORTALITY RATE							
	RURAL				HILLY			
	Neo-Natal	Post Neo-Natal	Infant	Toddler	Neo-Natal	Post Neo-Natal	Infant	Toddler
No	90.24	121.89	212.12	33.32	62.72	73.29	136.61	23.11
Yes	148.15	98.77	246.91	23.47	428.57	142.86	571.43	71.43

Term of Pregnancy and Previous Losses

The incomplete term of pregnancy has been found strongly related to the infant mortality and this relationship is very significant in the Rural group. The Table 6 indicates that it has more risk for children at the Neo-natal stage. The IMR for males was significantly higher (Rural group Male IMR 408.16, Female IMR 203.13 and Hilly group Male IMR 132.81 Female IMR 51.02) in both the population groups. The MR for the Toddlers was also higher if the term of pregnancy was incomplete.

Table 6 : Term of Pregnancy and Infant Mortality

Term	MORTALITY RATE							
	RURAL				HILLY			
	Neo-Natal	Post Neo-Natal	Infant	Toddler	Neo-Natal	Post Neo-Natal	Infant	Toddler
Incom- plete	292.04	194.69	486.73	67.96	97.35	70.80	168.14	32.73
Com- plete	85.79	117.92	203.71	31.88	60.48	74.57	135.05	22.19

The loss of previous pregnancies also showed a positive relationship with infant mortality i.e. higher IMR if mothers experienced pregnancy loss earlier. The rate of Neo-natal mortality in the Hilly group in this case was very high. The risk, again has been stronger at the Neo-natal stage and it is more for the male children.

Table 7 : Previous Pregnancy Losses and Infant Mortality

Loss	MORTALITY RATE							
	RURAL				HILLY			
	Neo-Natal	Post Neo-Natal	Infant	Toddler	Neo-Natal	Post Neo-Natal	Infant	Toddler
No	85.63	120.46	206.10	31.24	15.74	70.02	85.76	20.54
Yes	148.94	122.34	271.28	44.59	462.96	104.94	567.90	70.18

The relationship between previous infant deaths and loss of the index child in the Hilly population group indicate a higher IMR if there has been such a tragedy in the family earlier. The IMR in such cases was 158.90 as against 104.29 where no such a happening was reported. In the Rural group, however, no relationship between the two variable existed.

Sickness During Pregnancy

The respondents were asked about a number of diseases/symptoms they suffered from during the index pregnancy. They included : Palour (paleness of skin/eye-lids), Oedema (swelling on ankless and feet), Convulsions (fits), Malaria (high fever with chills), German Measles (Fever with rashes), Heart disease (shortness of breath/chest pain), Tuberculosis (chronic cough with weight loss), Diabetes (frequent urination and thirst), Renal infection (burning pain during urination with pus), Hypertension (high blood pressure), Anaemia (weakness) and accident/injury. The Table 8 presents the extent of relationship between the above mentioned ailments and infant mortality.

Table 8 : Ailments During the Index Pregnancy and Infant Mortality

Type of ailments		MORTALITY RATE							
		RURAL				HILLY			
		Neo-Natal	Post Neo-Natal	Infant	Toddler	Neo-Natal	Post Neo-Natal	Infant	Toddler
Palor	: NO	82.75	101.68	184.42	25.20	60.15	71.43	131.58	27.11
	YES	108.34	148.09	256.43	43.37	69.92	75.47	145.39	21.83
Oedema	: NO	88.72	117.84	206.56	30.65	64.31	69.26	133.57	20.73
	YES	186.21	179.31	365.52	92.20	222.22	444.44	666.67	187.50
Fits.	: NO	90.29	117.01	207.30	29.42	63.83	71.90	135.73	22.17
	YES	142.86	182.86	325.71	103.83	114.29	114.29	228.57	53.76
Malaria	: NO	93.52	117.93	211.50	32.42	57.61	68.31	125.93	23.00
	YES	84.91	198.11	283.02	46.73	114.68	105.50	220.18	30.93
Measles	: NO	93.31	122.79	216.09	34.83	64.10	71.64	135.75	19.13
	YES	92.37	96.39	188.76	14.78	93.46	102.80	196.26	96.15
Heart Disease	: NO	92.66	120.55	213.21	32.73	66.67	74.39	141.05	24.15
	YES	230.77	153.85	384.62	47.62	-	-	-	-
TB	: NO	93.29	120.40	213.69	32.32	66.24	74.00	140.24	24.10
	YES	88.24	147.06	235.29	90.91	71.43	71.43	142.86	-
Diabetes	: NO	92.96	120.30	213.25	32.53	66.29	73.97	140.27	23.98
	YES	130.43	173.91	304.35	71.43	-	-	-	-
Renal Infection	: NO	94.08	119.62	213.71	32.10	66.39	72.68	139.06	23.98
	YES	25.64	205.13	230.77	111.11	-	1000.00	1000.00	-
Hyper-Tension	: NO	91.67	119.87	211.54	32.93	66.39	74.07	140.46	24.04
	YES	500.00	333.33	833.33	-	-	-	-	-
Anaemia	: NO	90.88	122.15	213.03	32.31	64.94	72.15	137.09	23.82
	YES	209.68	48.39	258.06	96.77	106.38	127.66	234.04	28.57
Injury	: NO	86.61	115.60	202.21	33.11	62.50	74.70	137.20	25.15
	YES	175.21	183.76	358.97	27.52	107.44	66.12	173.55	8.26
Other Illness	: NO	92.13	120.71	212.84	32.92	65.92	74.33	140.25	23.92
	YES	294.12	117.65	411.76	-	142.86	-	142.86	-

The possible effect of certain ailments suffered by mothers during the index pregnancy on infant mortality leads us to observe that :

- (a) The infant mortality reported by the mothers who did not suffer from the above mentioned ailments was, in most of the cases, only slightly lower than the average IMR for the total sample of the concerned Rural and the Hilly population groups.
- (b) Some ailments such as German measles in the Rural and Heart disease, Tuberculosis, Diabetes and Hypertension in the Hilly population group had no effect on the IMR.
- (c) On the basis of the infant mortality reported by mothers who suffered from such ailments and who did not, we find substantial differences in the IMR in relation to a number of ailments. In the Rural population group, the IMR was very high if mothers suffered from Hypertension (IMR 833.33 as compared to 211.54 without this ailment); Heart diseases (IMR 384.62 and 213.21 respectively); Oedema (IMR 365.52 and 206.56); Accident/injury (IMR 358.97 and 202.21); Convulsions (IMR 325.71 and 207.30); Diabetes (IMR 304.35 and 213.25); Malaria (IMR 283.02 and 211.50); Anaemia

(IMR 258.06 and 213.03); Palour (IMR 256.43 and 184.42); Tuberculosis (IMR 235.29 and 213.69); and Renal infection (IMR 230.77 and 213.71 respectively).

In the Hilly population group Renal infection and Oedema of mothers during pregnancy are indicated as serious threat to child's survival. The IMR in cases where mothers suffered from Renal infection was 1000.00 as against 139.06 in case they did not suffer from this disease. In case mothers suffered from Oedema, the IMR was found to be 666.67 as compared to 133.57 if they did not suffer from this ailment. The IMR, if mothers suffered from Anaemia, was 234.04 (137.09 if mothers did not suffer); and in case they suffered from Convulsion 228.57 (as against 135.73); Malaria 220.18 (against 125.93); German measles 196.26 (against 135.75); Accident/injury 173.55 (against 137.20) and Palour 145.39 (against 131.58 if they did not suffer from it).

- (d) In the Rural group, the ailments of mothers during the index pregnancy such as Oedema, Heart diseases, Hypertension and Anaemia were found associated with a higher Mortality Rate at the Neo-natal stage. The other ailments such as Palour, Convulsions, Malaria, Tuberculosis, Diabetes and injury were associated with a higher Mortality Rate at the post-Neo-natal stage. In the Hilly population group,

the mothers' ailments such as Malaria and accident/injury had affected the survival of children in the Neo-natal stage more than in the post Neo-natal stage, while the rest of the diseases had proved a serious risk to the children in the post Neo-Natal stage.

The conditions of general health of mothers during pregnancy does not seem to have had much effect on infant mortality. In the Rural group the IMR related to children of mothers with below normal, normal and above normal health conditions was 254.24, 286.82 and 252.92 respectively. In the Hilly group the IMR related to the children belonging to mothers with below normal, normal and above normal health conditions during this period was 230.24, 473.68 and 181.82 respectively. Thus, the IMR in this population group was very high if the mothers had normal health. Another significant aspect to point out is that mortality rate among toddler group was high (90.91) if the mothers in the Hilly group had above normal health or they had below normal health.

Antenatal Care

We also examined the effect of the antenatal care received by mothers during the index pregnancy. It was asked whether the mother got herself registered at a government or private health centre/clinic during the index pregnancy.

In the Rural group, we did not find any evidence of such relationship as is evident from the fact that the IMR in case of those registered was 220.96 as against 212.77 who were not registered. In the Hilly group, however, there was some tendency of higher IMR in case of those who were not registered (144.81) than those who were registered at health centres (128.95).

Keeping contacts with the health personnel helps the expectant mothers in two ways : (a) getting knowledge about the precautions they have to take during the various stages of pregnancy, and (b) getting prompt assistance in case of any contingency. We asked the respondents two questions - (i) whether they maintained routine contacts with health personnel during the period of pregnancy and (ii) whether they established special contacts with the health personnel during a contingency. The IMR was found considerably lower in the Rural group when routine contacts were maintained with ANM/Nurse (124.29), Health Visitor (94.34) and government doctor (176.92). In the Hilly group also the routine contact had a positive impact on the IMR, particularly, when contacts were maintained with Health Guide (45.45), Health Visitor (44.59) and Registered Medical Practitioner (79.14).

Timely special contacts with health workers at the time of some emergency or problem seems to have had very positive effect, except when a Dai was contacted. In both the Rural

and Hilly groups the IMR was low when special contacts were established with the Health Guide (Rural 128.71, Hilly 111.11), ANM/Nurse (Rural 150.00, Hilly 114.01), Health Visitor (Rural 94.34, Hilly 73.17) or a Government Doctor (Rural 174.60 Hilly 99.04). A low IMR in the Hilly group was also found in case special contacts were established with the Registered Medical Practitioners (49.50).

Regarding the two significant precautions at the pre-Natal stage, i.e. receiving injections of Tetanus toxide and Iron tablets, we find in Table 9 that the full course of three doses of Tetanus toxide injections and Iron tablets certainly have a relationship with low IMR.

Table 9 : Receiving Tetanus Toxide Injections and Iron Tablets by Mothers and Infant Mortality

Doses	MORTALITY RATE							
	RURAL				HILLY			
	Neo-natal	Post Neo-natal	Infant	Toddler	Neo-natal	Post Neo-natal	Infant	Toddler
<u>Tetanus Toxide</u>								
No	101.44	127.76	229.20	32.21	62.69	87.56	150.25	35.38
Yes (1-2 doses)	68.63	147.06	215.69	60.34	160.00	40.00	200.00	-
(3 doses)	68.25	91.99	160.24	27.78	69.48	42.18	111.66	3.45
<u>Iron Tablets</u>								
No	97.32	125.61	222.93	32.12	60.76	86.65	147.41	35.32
Yes	70.69	93.56	164.24	35.76	79.25	44.29	123.54	3.36

Dietary Intake During Pregnancy

The normal dietary intake by mothers during pregnancy is essential as it helps in minimising risks at natal and post-natal stages. The mothers were, therefore, asked whether their dietary intake was normal during the index pregnancy. We find in the Table 10 that the normal intake of cereals, pulses, fat/oil, eggs and meat/fish was associated with low IMR in the Rural population group. However, the IMR in relation to leafy vegetables and other vegetables, Roots and tubers, milk and sugar/jaggery was lowest when they were not taken at all during pregnancy. In the Hilly population group, the lowest IMR was found when the intake of cereals, pulses, leafy and other vegetables milk, fat/oil, sugar/jaggery, eggs and meat/fish was normal. However, the lowest IMR in case of roots and tubers was found when they were not taken at all.

The IMR was found to be the highest in the Rural group when cereals pulses and fat/oil were not taken at all. In the Hilly group such a condition was found if pulses leafy and other vegetables were not taken. A higher IMR was also found in the Rural group, if the intake of cereals, pulses, leafy and other vegetables, roots and tubers, milk and meat/fish was above the normal quantity. Similar condition was found, in the Hilly group, in case of pulses, leafy vegetables, roots and tubers, milk, fat/oil, eggs and meat/fish.

Table 10 : Dietary Intake During Pregnancy and Infant Mortality

Diet taken	MORTALITY RATE							
	RURAL				HILLY			
	Neo- natal	Post Neo- natal	Infant	Toddler	Neo- natal	Post Neo- natal	Infant	Toddler
	2	3	4	5	6	7	8	9
<u>Cereals</u>								
Didn't take	285.71	142.86	428.57	-	-	-	-	-
Below normal	118.07	142.71	260.78	33.75	88.47	80.57	169.04	34.06
Normal	74.77	98.98	173.75	29.31	49.16	68.56	117.72	16.98
Above normal	123.29	184.93	308.22	48.58	43.48	86.96	130.43	-
<u>Pulses</u>								
Didn't take	142.86	190.48	333.33	52.63	-	1000.00	1000.00	-
Below normal	107.51	115.85	223.35	33.17	92.25	81.18	173.43	33.33
Normal	27.50	116.85	204.35	33.20	45.77	59.86	105.63	17.05
Above normal	62.50	177.08	239.58	26.02	166.67	222.22	388.89	54.05
<u>Leafy Veggies.</u>								
Didn't take	54.62	113.45	168.07	41.77	83.33	250.00	333.33	-
Below normal	113.61	149.44	263.05	34.15	95.68	67.54	163.23	36.05
Normal	88.08	96.89	184.97	31.04	44.36	68.35	112.71	15.41
Above normal	84.11	186.92	271.03	26.82	111.11	185.19	296.30	56.18
<u>Other Veggies.</u>								
Didn't take	72.73	115.15	187.88	46.00	129.03	161.29	290.32	27.03
Below normal	89.66	110.34	200.00	32.86	99.25	76.78	176.03	28.94
Normal	101.33	125.00	226.33	30.92	41.21	66.67	107.88	15.42
Above normal	78.79	181.82	260.61	22.22	93.02	116.28	209.30	150.00

1	2	3	4	5	6	7	8	9
<u>Roots and Tubers</u>								
Didn't take	61.31	104.90	166.21	33.82	45.80	53.44	99.24	-
Below normal	100.08	122.79	222.08	32.39	77.55	69.39	146.94	43.78
Normal	104.73	119.84	224.57	26.49	61.46	75.54	137.00	15.87
Above normal	111.11	166.67	277.78	66.04	96.77	193.55	290.32	-
<u>Milk</u>								
Didn't take	41.49	128.63	170.12	44.20	28.17	154.93	183.10	15.38
Below normal	105.00	110.07	215.06	37.65	73.25	78.36	151.62	30.60
Normal	91.88	120.59	212.47	23.79	62.33	54.20	116.53	20.41
Above normal	85.91	164.95	250.86	36.86	108.11	243.24	351.35	25.64
<u>Fat/Oil</u>								
Didn't take	63.19	173.08	236.26	46.10	41.18	88.24	129.41	24.88
Below normal	102.66	124.11	226.77	32.26	35.25	81.19	166.44	26.09
Normal	88.76	99.15	187.91	29.13	43.82	55.78	99.60	17.21
Above normal	100.00	111.76	211.76	22.03	136.36	136.36	272.73	111.11
<u>Sugar/Jaggery</u>								
Didn't take	68.97	97.18	166.14	26.00	13.70	136.99	150.68	20.69
Below normal	100.07	117.00	217.07	32.02	140.41	119.86	260.27	51.89
Normal	93.36	134.65	228.01	37.25	39.36	57.81	97.17	12.26
Above normal	88.24	111.76	200.00	30.73	82.35	54.90	137.25	19.42
<u>Egg</u>								
Didn't take	87.31	126.88	214.19	35.52	54.83	88.77	143.60	14.61
Below normal	116.05	107.45	223.50	29.13	94.66	71.76	166.41	33.61
Normal	85.00	95.00	180.00	12.05	28.42	62.02	90.44	17.24
Above normal	57.14	142.86	200.00	43.48	125.00	125.00	250.00	66.67
<u>Meat/Fish</u>								
Didn't take	87.77	123.25	211.02	33.62	39.13	91.30	130.43	17.54
Below normal	112.64	112.64	225.27	29.00	92.99	68.79	161.78	24.90
Normal	78.34	119.82	198.16	34.75	32.34	67.16	99.50	21.98
Above normal	111.11	133.33	244.44	37.04	-	250.00	250.00	142.86

A higher IMR was found in the rural group, if the intake of fat/oil, sugar/jaggary and eggs was below the normal quantity. In the Hilly group, higher IMR has been found associated with below the normal intake of cereals and sugar/jaggary. Thus, it seems, that below or above normal dietary intake of certain items increases risk while the normal intake of certain food items minimises the risk for the child.

It seems from the discussion above that the normal vegetarian diet of mothers during pregnancy is better than taking extra food. We find a lower mortality rate among infants if during pregnancy their mothers in the Rural group, maintained normal diet (214.57), did not avoid any food (212.76) and were vegetarian (213.96). In comparison, the IMR was higher if mothers took extra food (225.00) avoided certain food (246.91) and were non-vegetarian (215.43).

In the Hilly group also the IMR was low if mothers did not take extra food (137.86) and were vegetarian (139.62) as compared to those who took extra food (250.00) and were non-vegetarian (142.86). However, the IMR was found lower among infants whose mothers avoided certain food (132.74) than among those who did not (140.42). Our presumption is that the dietary habits during pregnancy are determined by tradition which usually conform to the climatic conditions in the hills during pregnancy.

Activities During Last Trimester

The study also tried to find out the relationship between infant mortality and the time spent by mothers during their last trimester in different activities, such as domestic work, income generating work and leisure and sleep. There seems to be a relationship between the two variables. Time spent on domestic work without strain has relation with the lowest IMR in both the Rural (170.73) and the Hilly population (104.25) groups. The IMR increased consistently with the increase in the number of hours the mothers spent in domestic work per day. Those who spent more than 6 hours a day had the highest IMR (Rural 263.80, Hilly 285.71).

The pattern in relation to the number of hours spent on strenuous wage earning/income generating activities in the Rural group was similar. It had the lowest IMR in case of those not engaged in such activities (207.48) followed by those who spent upto 3 hours a day (227.36), 4-6 hours (245.76), and more than 6 hours (333.33). In the Hilly group, however, the trend was that those who worked for upto 3 hours a day had a significantly low IMR (83.54) than those who did not work at all (167.19).

The relationship between hours of rest per day during the last trimester, both in Rural and Hilly groups, seems to have had an adverse effect on infant mortality. Those who had upto 3 hours of rest per day had a low IMR (Rural

195.12, Hilly 125.00) than those who had more than 3 hours rest (Rural 221.52, Hilly 155.01).

The effect of the number of hours of sleep exceeded eight hours than in the case of 7-8 hours (223.45). In the Hilly group, however, the lowest IMR was found when mothers used to sleep for only upto 6 hours a day in the last trimester (92.59) than those who used to sleep for more than 8 hours (151.51).

Addictive Habits

Some of the addictive personal habits of mothers during the index pregnancy seems to have had considerable impact on the infant mortality. In Table 11 we present the relationship between smoking/chewing tobacco, drinking liquor/alcohol and consuming addictive drugs and the infant mortality.

The adverse effect of personal habits of mothers on the IMR mentioned in Table 11 has been found to be sharper in the Rural group than in the Hilly group. Secondly, the effect of the use of liquor/alcohol on infant mortality has been nil in the Hilly group whereas it is severe in the Rural group. Thirdly, the adverse effect of smoking/chewing tobacco and drinking of liquor/alcohol in the Rural group, has been greater at the post-Neo-natal stage while that of

Table 11 : Personal Habits During Pregnancy and Infant Mortality

Habits	MORTALITY RATE							
	RURAL				HILLY			
	Neo-natal	Post Neo-natal	Infant	Toddler	Neo-natal	Post Neo-natal	Infant	Toddler
<u>Smoke/Chew Tobacco</u>								
No	90.61	112.51	203.12	29.56	65.29	74.52	139.82	22.44
Yes	109.34	170.84	280.18	53.80	125.00	41.67	166.67	130.43
<u>Drink Liquor/Alcohol</u>								
No	92.02	118.82	210.85	33.02	66.48	74.18	140.66	24.01
Yes	200.00	285.71	485.71	-	-	-	-	-
<u>Consume Addictive Drugs</u>								
No	93.09	120.60	213.69	32.87	66.39	72.68	139.06	24.01
Yes	166.67	166.67	333.33	-	-	1000.00	1000.00	-

addictive drugs it was equal at both the Neo-natal and post Neo-natal stages. In the Hilly group, the use of addictive drugs has been found related to a very high mortality rate at post neo-natal stage while smoking/chewing tobacco has been found associated with a higher mortality rate at the Neo-natal stage.

Loss of Weight

Loss of weight of mothers during the pregnancy period seems to have had a serious risk for the life of the child,

both at the infant and toddler stages. We find the high IMR (Rural 358.63, Hilly 374.05) was associated with the loss of weight of mothers during pregnancy. The adverse effect of such a condition in the Rural group was nearly equal at Neo-natal (MR 178.37) and the post Neo-natal (MR 180.27) stages. In the Hilly group, however, the mortality rate at the Neo-natal stage (229.01) was significantly higher than at the post Neo-natal stage (145.04). The toddler mortality rate in both the population groups was also higher when mothers lost their weight (Rural 59.79, Hilly 59.70) than in the case of mothers weight remaining stationary (Rural 28.57, Hilly 21.19).

Natal Risk Factors

To start with the Natal Risk Factors, a set of questions relating to the conditions during labour and delivery were asked. They related to the On-set of labour, duration of labour, type of presentation (part of baby's body coming out first), type of delivery, place of delivery, type of birth attendant, in case of delivery at home, the conditions of bleeding before and after the delivery and rupture of perineal region. The relationship between these conditions and infant mortality is presented in Table 12.

Table 12 : Conditions During Labour and Delivery and Infant Mortality

Conditions	MORTALITY RATE							
	RURAL				HILLY			
	Neo-natal	Post Natal	Infant	Toddler	Neo-natal	Post Natal	Infant	Toddler
1	2	3	4	5	6	7	8	9
<u>On-set of Labour</u>								
Upto 8 months	167.36	154.81	322.18	30.30	69.96	57.61	127.57	36.50
9 & more months	87.11	117.87	204.98	32.96	65.55	77.31	142.86	21.46
<u>Duration of Labour</u>								
Upto 6 hours	91.39	105.96	197.35	38.63	37.50	57.50	95.00	20.67
6-12 hours	92.54	140.48	233.02	31.94	42.11	94.74	136.84	15.18
More than 12 hours	95.00	99.43	195.43	26.70	193.68	94.86	238.54	47.95
<u>Type of Presentation</u>								
Head	87.66	121.95	209.61	34.09	65.74	74.77	140.51	19.80
Other parts	142.38	109.27	251.66	18.75	70.42	65.73	136.15	46.51
<u>Place of Delivery</u>								
Home	91.09	121.46	212.55	33.81	58.33	75.00	133.33	24.48
Hospital	130.95	107.14	233.10	14.35	159.29	61.95	221.24	16.67
<u>Birth Attendant at Home</u>								
None	92.11	118.42	210.53	14.49	225.35	42.25	267.61	22.73
Female relative	59.70	134.33	194.03	18.18	11.63	81.40	93.02	16.39
Untrained Dai	83.33	120.93	204.25	35.26	59.57	97.87	157.45	20.94
Trained Dai	107.18	119.34	226.52	26.74	57.69	96.15	153.85	38.14
ANM/Nurse	105.61	108.91	214.52	52.63	50.85	47.46	98.31	20.53
Private Doctor	73.53	161.75	235.29	21.28	81.63	36.73	118.37	9.52
Govt. Doctor	170.73	146.34	317.07	25.00	60.61	151.52	212.12	17.54

Table 12 (Contd....)

	1	2	3	4	5	6	7	8	9
<u>Type of Delivery</u>									
Vaginal	91.64	118.39	210.03	33.50	62.55	72.34	134.89	18.54	
Cesarian	121.95	178.86	300.81	19.61	116.50	87.38	203.88	77.92	
<u>Excessive Bleeding Before On-set of Labour</u>									
No	89.25	118.50	207.75	31.49	47.30	69.26	116.53	17.72	
Yes	114.23	132.26	246.49	44.55	156.63	96.39	253.01	57.47	
<u>Excessive Bleeding After the delivery</u>									
No	87.16	111.82	198.98	33.88	42.15	70.25	112.40	15.49	
Yes	111.54	147.44	258.97	29.72	197.31	94.17	291.48	71.43	
<u>Rupture of Perineal Region</u>									
No	91.09	122.99	214.07	32.55	64.17	74.05	138.22	24.10	
Yes	164.84	43.96	208.79	49.18	266.67	66.67	333.33	-	
<u>Birth Size of Baby</u>									
Smaller	171.88	220.49	392.36	88.76	200.00	144.00	344.00	40.54	
Usual	74.49	97.17	171.66	24.53	54.37	67.77	122.14	22.67	
Larger	108.43	120.48	228.92	35.29	38.46	38.46	76.92	-	
<u>Season of Delivery</u>									
Summer	106.06	143.10	249.16	30.53	60.61	57.85	118.46	27.52	
Monsoon	57.22	108.99	166.21	46.53	41.88	94.24	136.13	19.35	
Winter	116.17	121.06	237.23	25.95	84.44	71.11	155.56	24.77	

We find that the trends in the infant mortality in relation to most of the conditions during labour and delivery such as on-set of labour, duration of labour, type of presentation, birth attendant, rupture of perineal region, size of baby at birth and season of delivery were different in the two population groups of Rural and Hilly. The pattern of relationship between type of delivery, place of delivery, excessive bleeding before the on-set of labour and after the delivery and infant mortality was, however, similar in both the population groups. For example, the IMR was found higher in case of cesarian delivery (Rural 300.81, Hilly 203.88). However, a significantly higher mortality was reported for children in the post Neo-natal stage (178.86) in the Rural group than in the Neo-natal (121.95) stage. In the Hilly, the situation was just the opposite, i.e. a higher mortality at the Neo-natal (116.50) than at the post Neo-natal (87.38) stage.

Place of Delivery

Surprisingly, a higher IMR was found in case the place of delivery was a hospital (Rural 238.10, Hilly 221.24) than the home (Rural 212.55, Hilly 133.33). In both the population groups, the mortality rates at the Neo-natal stage (Rural 130.95, Hilly 159.29) were significantly higher than the mortality rates at the post Neo-natal (Rural 107.14, Hilly 61.95) stage.

Excessive Bleeding

Excessive bleeding before the on-set of labour or after the delivery have been found associated with a high infant mortality rate in both the population groups (Rural 246.49 and 258.97, Hilly 253.01 and 291.48 respectively). However, in the Rural group a higher mortality rate at the post Neo-natal and, in the Hilly group, at the neo-natal stage have been noticed.

On-set and Duration of Labour

In the Rural group, a very high IMR has been found when the on-set of labour was in the pregnancy period of upto 8 months (322.18). The mortality rate in the Neo-natal stage was higher (167.36) than in the post Neo-natal period (154.81). In the Hill group, the month of on-set of labour does not seem to influence mortality rate. The duration of labour has shown to have serious effect on the Hill population group as the IMR was 288.54 when the duration of labour exceeded 12 hours. Its effect was more serious on the infants in the Neo-natal stage as their mortality rate was 193.68 as compared to 94.86 among children in the post Neo-natal stage. In the rural group, on the other hand a higher IMR (233.02) was found when the duration of labour was between 6 and 12 hours. A higher IMR in the Rural group was found if the baby's other body parts, than the head, came out first

(251.66) and children in the Neo-natal stage suffered more (MR 142.38) than in the post Neo-natal stage (109.27).

Birth Attendant

Surprisingly, a very high IMR was found in the Rural group (317.07) when the birth was attended by a government doctor, or by a private doctor (235.29) or a trained Dai (226.52). In the Hilly group, however, the highest IMR (267.61) was found when none attended the birth followed by an IMR of 212.12 when the delivery was attended by a government doctor.

The rupture of the perineal region seems to have proved a serious risk for the Hilly group where the IMR was found very high (333.33). The impact of such a risk factor was felt more for children at the Neo-natal stage (MR 266.67) than for those in the post Neo-natal stage (66.67).

Birth Size of Baby and Season of Delivery

The smaller than usual size of the baby at birth seems to be a significant risk as we find a very high IMR among such infants in both the Rural (392.36) as well as Hilly (344.00) groups. The toddler mortality was also found higher if the size of the baby at birth was smaller than usual.

In the Rural group larger than usual size of the baby at birth has also been found associated with high IMR (223.92) but in the Hilly group such babies had the lowest IMR (76.92). The lowest IMR was recorded if the season of delivery in the Rural group was Mansoon and Summer in the Hilly group.

Problems/Complications at Child Birth

Some of the problems/complications experienced by the child at birth proved to be a serious risk for the new born. The infant mortality rate in the Rural group was found particularly very high when they suffered from cord infection (344.26), Birth injury (342.86), Immaturity (482.35), Low weight (409.67), Cyanosis (377.36), Icterus (311.48), Convulsions (490.91), Respiratory distress (354.17), Malformation (428.57), Abdominal distension (252.53) and other illness (529.41).

In the Hilly group, the IMR was very high when the new born suffered from Cord Infection (500.00), Birth injury (200.00), Prematurity (263.16), Low weight (254.90), Convulsions (225.81), Respiratory distress (333.33), Poor feeding (205.48), Abdominal distension (302.33) and other unidentified illness (1000.00).

In Table 13, we present the relationship between complications experienced by the child at birth and mortality rate at Neo-natal, post Neo-natal, infant and toddler stages.

In the Rural group, the mortality rate was higher among children at the Neo-natal stage if they suffered from cord infection, birth injury, Cyanosis and other unspecified illness. The mortality rate was found higher among the children at the post Neo-natal stage if they had suffered from prematurity, low weight, icterus, convulsions, respiratory distress, malformation, vomiting, poor feeding and abdominal distension at birth.

In the Hilly group, the risk was found greater and the mortality rate higher at the Neo-natal stage if children had suffered from prematurity. The mortality rate was almost equal in the Neo-natal and post Neo-natal stages, in case children had suffered from birth injury and respiratory distress. However, the mortality rate was higher at the post Neo-natal stage if children had suffered from cord infection, low weight, cyanosis, icterus, convulsions, malformation, vomiting, poor feeding, abdominal distension and other unspecified illness.

In the Rural group, the mortality rate at the toddler stage was also found higher among children who had suffered from cord infection, low weight, icterus, convulsions,

Table 13 : Complications Experienced by Children at Birth and Infant Mortality

Complications	MORTALITY RATE							
	RURAL				HILLY			
	Neo- natal	Post Neo- natal	Infant	Todd- ler	Neo- natal	Post Neo- natal	Infant	Todd- ler
1	2	3	4	5	6	7	8	9
<u>Cord Infection</u>								
No	86.13	119.70	205.83	31.90	65.91	72.29	138.20	23.59
Yes	207.65	136.61	344.26	50.00	166.67	333.33	500.00	34.48
<u>Birth Injury</u>								
No	86.56	121.32	207.89	32.84	66.53	74.31	140.84	23.42
Yes	235.71	107.14	342.86	31.75	100.00	100.00	200.00	58.82
<u>Prematurity</u>								
No	89.27	117.16	206.43	32.70	64.81	74.79	139.60	24.33
Yes	235.29	247.06	482.35	37.97	210.53	52.63	263.16	-
<u>Low Weight</u>								
No	79.96	105.88	185.83	25.26	62.83	69.64	132.48	24.17
Yes	185.75	223.92	409.67	125.83	117.65	137.25	254.90	18.18
<u>Cyanosis</u>								
No	87.24	120.95	208.20	33.20	68.39	71.99	140.39	24.27
Yes	264.15	113.21	377.36	18.52	-	176.47	176.47	-
<u>Icterus</u>								
No	92.15	119.83	211.98	31.83	68.99	74.07	143.06	24.78
Yes	147.54	163.93	311.48	90.91	-	86.96	86.96	-
<u>Convulsions</u>								
No	91.65	117.32	208.97	32.18	66.81	72.56	139.37	23.71
Yes	181.82	309.09	490.91	86.96	64.52	161.29	225.81	27.03

Table 13 (Contd....)

	1	2	3	4	5	6	7	8	9
<u>Respiratory Distress</u>									
No		90.91	118.58	209.49	31.39	64.61	72.51	137.11	23.85
Yes		166.67	187.50	354.17	85.71	166.67	166.67	333.33	21.28
<u>Malformation</u>									
No		92.23	118.77	211.00	32.86	68.69	72.31	141.00	24.78
Yes		166.67	261.90	428.57	29.41	-	150.00	150.00	-
<u>Poor Feeding</u>									
No		91.75	115.12	206.87	32.38	65.19	72.59	137.78	19.76
Yes		112.61	193.69	306.31	37.74	95.89	109.59	205.48	79.65
<u>Abdominal Distension</u>									
No		93.64	119.02	212.66	32.47	66.67	69.57	136.23	21.86
Yes		80.81	171.72	252.53	44.25	69.77	232.56	302.33	61.73
<u>Other Illness</u>									
No		92.13	120.06	212.20	32.97	66.85	73.19	140.04	23.81
Yes		294.12	235.29	529.41	19.61	-	1000.00	1000.00	-

respiratory distress and abdominal distension at their birth. In the Hilly population group, such a position of higher risk at toddler stage was found if they had suffered from cord infection, birth injury, vomiting, poor feeding and abdominal distension.

Post-Natal Risk Factors

The post-natal risks for the new born babies start from feeding. The interview schedule for this stage, therefore, started with the enquiry whether any pre-lacteal feed was given to the new born before breast milk. The responses have been analysed in relation to their significance pertaining to the mortality rate.

Pre Lacteal Feed

The highest infant mortality rate, in both the Rural and Hilly groups, was recorded if no pre-lacteal feed was given to the baby before breast milk (Rural 397.06 and Hilly 417.72). This proved much more fatal to the babies in the Neo-natal stage as their mortality rate in the Rural group was 338.24 and in the Hilly group 324.89 in comparison to the mortality rate at the post Neo-natal stage, i.e. 58.82 and 92.83 respectively. The IMR was also significantly higher in the Rural group if sweetened water or honey was given as a

pre-lacteal feed before the breast milk (218.54 and 225.81 respectively). The impact of these feeds was significantly higher at the post Neo-natal stage. The IMR was significantly lower in the Rural group if Musk, animal milk or other women's milk was given as a pre-lacteal feed before the breast milk. In the Hilly group, a very low IMR was found when the new-born babies were given musk, honey, other women's milk and sweetend water. The Table 14 presents the details:

Table 14 : Pre-Lacteal Feed to the New Born Before Breast Milk and Infant Mortality

Pre-Lacteal Feed	MORTALITY RATE							
	RURAL				HILLY			
	Neo-natal	Post Neo-Natal	Infant	Toddler	Neo-natal	Post Neo-natal	Infant	Toddler
No	338.24	58.82	397.06	29.13	324.89	92.83	417.72	54.73
Sweetend water	86.09	132.45	218.54	46.73	19.28	33.06	52.34	22.39
Honey	84.15	141.65	225.81	33.18	16.74	66.95	83.68	21.56
Musk	148.15	37.04	185.19	-	55.56	55.56	111.11	-
Animal Milk	79.15	105.53	184.68	31.10	3.34	127.09	130.43	11.49
Other Woman's Milk	46.88	46.88	93.75	10.53	38.46	38.46	76.92	21.28

The feed of cholastrum to the new born immediately after birth has been found as having a relationship with higher IMR in the Rural group. In the Hilly group, however, it shows a negative relationship with IMR. In the Rural group the IMR

has been found at 269.46 where the colostrum was given as against the IMR 203.34 where it was not given. The reverse position in the Hilly group shows an IMR 180.69 where no colostrum was given and 100.29, if it was given. In case the colostrum was given, the mortality rate at the post Neonatal stage was considerably higher (Rural 195.61 and Hilly 83.09) than at the Neo-natal stage (Rural 73.85 and Hilly 17.19).

Duration of Breast Feeding and Introduction of Supplementary Food

On this point a question about how long the child was breast fed without supplementary food was asked. We find a very high infant mortality rate if the children were not breast fed. The serious effect of this feeding aspect has been found on children in the Neo-natal stage. Although there is lack of consistency in the results yet one can discern that the trend indicate lower IMR in case children were breast fed for a longer duration. This possibly indicate that the breast feeding for longer duration protects children against various infections through supplementary food. Besides, mother's milk seems to have more nutritional value. However, supplementary food at appropriate age is also essential for the healthy growth of the child. This aspect is supported from the information about the age of the child

when he was introduced to supplementary food. Tables 15 and 16 present the trend of infant mortality in relation to the duration of breast feeding and age when supplementary foods were introduced to the infants respectively.

Table 15 : Duration of Breast Feeding without Supplementary Food and Infant Mortality

Duration (months)	MORTALITY RATE							
	RURAL				HILLY			
	Neo- Natal	Post Neo- natal	Infant	Todd- ler	Neo- natal	Post Neo- natal	Infant	Todd- ler
No breast feeding	592.59	43.21	635.80	27.78	462.43	86.71	549.13	71.43
0 - 6	46.57	160.48	207.05	41.67	10.78	86.23	97.01	95.24
7 - 9	8.33	91.67	100.00	176.47	37.38	65.42	102.80	27.78
10 - 12	24.14	100.00	124.14	49.85	15.27	38.17	53.44	12.41
Above 12	28.12	82.60	110.72	29.59	-	39.55	39.55	21.00

Table 16 : Age of Child When Supplementary Foods were Introduced to Him and Infant Mortality

Food/ Months	MORTALITY RATE							
	RURAL				HILLY			
	Neo- natal	Post- neo- natal	Infant	Toddler	Neo- natal	Post Neo- natal	Infant	Toddler
<u>Animal Milk/Powder Milk</u>								
0 - 7	21.77	107.62	129.38	36.40	13.33	86.67	100.00	16.95
7 - 8	25.64	71.79	97.44	24.47	-	35.71	35.71	12.66
Above 8	127.49	130.33	257.82	36.97	113.43	67.80	181.23	59.21
<u>Cereals</u>								
0 - 7	29.27	131.71	160.98	34.65	49.02	68.63	117.65	15.50
7 - 8	18.80	101.50	120.30	35.38	-	12.35	12.35	9.01
Above 8	105.60	121.36	227.76	31.29	72.58	79.03	151.61	30.25
<u>Biscuits</u>								
0 - 7	21.41	97.86	119.27	35.01	19.70	64.04	83.74	9.90
7 - 8	27.78	83.33	111.11	32.76	-	37.71	37.74	17.66
Above 8	110.05	127.93	237.98	32.20	81.69	79.89	161.58	50.77
<u>Pulses</u>								
0 - 7	29.70	79.21	108.91	39.18	33.61	75.63	109.24	9.52
7 - 8	27.12	91.52	118.64	40.38	-	50.85	50.85	22.77
Above 8	105.50	127.13	232.64	28.41	76.73	76.73	153.46	29.41
<u>Vegetables</u>								
0 - 7	-	25.00	25.00	76.02	43.96	32.97	76.92	13.33
7 - 8	38.25	109.29	147.54	31.20	-	50.51	50.51	21.28
Above 8	99.34	124.09	223.42	30.83	73.80	79.48	153.28	26.83
<u>Fruits</u>								
0 - 7	11.90	59.52	71.43	68.49	46.51	23.26	69.77	24.39
7 - 8	48.00	152.00	200.00	39.55	-	32.97	32.97	24.66
Above 8	97.50	121.11	218.61	30.65	73.03	81.06	154.09	23.38
<u>Eggs</u>								
0 - 7	-	111.00	111.00	76.92	62.50	-	62.50	-
7 - 8	-	76.92	76.92	47.62	-	96.77	96.77	7.30
Above 8	93.89	120.90	214.79	32.50	68.38	75.74	144.12	26.58

We find that the late introduction of supplementary foods to the child such as animal milk, cereals, biscuits, pulses, vegetables, fruits and eggs was related to a higher infant mortality, in both the Rural and Hilly population groups. The adverse effect has been more pronounced at the post Neo-natal stage than at the Neo-natal stage as the children in this period normally depend on mother's milk.

Immunisation

The immunisation against certain serious diseases seems to have had a very positive effect on the survival of infants. The results were similar in both the Rural and Hilly population groups. The questions regarding the number of doses of BCG, Polio and DPT/ Tripple antigen vaccine given to the child also indicate a comparatively higher IMR if full doses of Polio and DPT/Tripple antigen vaccine in the Rural group and Polio vaccine in the Hilly group were not given. In Table 17 we present the data for the two selected groups of population.

The IMR was considerably higher if children were not immunised. On the other hand, the IMR was very low if children were immunised against Tuberculosis, Polio, Diptheria, Whooping cough, etc. The analysis indicates a very positive effect of immunisation on the survival rate of infants.

Table 17 : Immunisation of Children and Infant Mortality

Vaccine	MORTALITY RATE							
	RURAL				HILLY			
	Neo-natal	Post neo-natal	Infant	Toddler	Neo-natal	Post neo-natal	Infant	Toddler
<u>BCG</u>								
No dose	104.51	120.75	225.26	32.74	76.61	86.49	163.10	32.03
1 dose	21.23	120.28	141.51	33.05	9.57	4.78	14.35	7.17
<u>Polio</u>								
No dose	106.34	130.18	236.52	38.01	70.88	80.03	150.91	29.27
1 dose	-	68.97	68.97	31.06	48.78	24.39	73.17	30.93
2 doses	19.61	39.22	58.82	29.05	-	-	-	-
3 doses	-	58.82	58.82	10.79	-	-	-	2.92
<u>DPT/TRIPPLE ANTEGIN</u>								
No dose	101.33	126.48	227.81	35.12	71.97	79.55	151.52	31.70
1 dose	-	94.34	94.34	54.05	-	-	-	-
2 doses	31.25	62.50	93.75	11.49	-	-	-	-
3 doses	-	20.00	20.00	13.48	-	14.08	14.08	-

Contacts with Health Personnel

Maintaining routine contact with various levels of health personnel for post-natal care of the child within two months of delivery found to have had a significant effect. The IMR,

in the Rural population group, was significantly low if the contacts were maintained with Health Guide (58.82), Health visitor (79.37), ANM/Nurse (90.91) and Government doctor (128.63). However, the effects of routine contacts with Dai and private doctor were not visible. In case the contacts were maintained with these personnel the IMR was 248.02 and 245.03 respectively.

In the Hilly population group also the IMR was found significantly low in case routine contacts were maintained with health personnel. The IMR was 0.00, in case contacts were maintained with Health Guide, 21.28 if contacted the Health Visitor, 42.94 if contacted the private doctor, 36.27 if the ANM/Nurse was contacted, 71.09 if the Government doctor was contacted and 81.08 if a Dai was contacted for post-Natal care.

We also enquired whether special purpose contacts were also established with the health personnel for post-Natal care of the child. Our purpose was to know whether the immediate precautions were taken in case the child developed any problem. We find a low IMR, in the Rural group, in case Health Guides (81.97), ANM/Nurse (87.14) or Health Visitors (87.72) were contacted for special purposes. The IMR was also low (157.56) if the Government doctor was consulted. However, the IMR was found to be higher when Dai (257.92) and private doctors (243.74) were contacted in such contingencies.

In the Hilly group also, the IMR was higher if Dai was contacted for some special purpose (155.56). The IMR was found significantly low if Health Guides (0.00), Health Visitors (10.53), Private doctors (18.52), Amm/Nurse (60.24) and Government doctors (62.50) were consulted. This indicates that the timely advice and assistance of the health personnel helps in reducing the risk of mortality and increasing the survival rate.

Diseases

We also enquired whether the child suffered from any serious illness such as fever (including Malaria, Influenza and Typhoid), coughs (including Pneumonia, Bronchitis, Asthma, Whooping cough and Tuberculosis), Digestive disorders (such as Diarrhoea, Dysentery, Gastro-enteritis, Peptic ulcer and acute abdomen), Nervous disorders (including convulsions, meningitis, paralysis), Circulatory disorders (including Anaemia, Heart trouble) and Other ailments (such as Tetanus, Jaundice, Measles, diabetes, malnutrition, accident/injury). We analyse in Table 18 the relationship between these ailments and the infant mortality.

From the Table 18, it is found that the effect of the ailments on infants was very serious, except in case of fevers in the Rural group. The most serious among the listed diseases were ailments categorised as others (such as Tetanus,

Table 18 : Children Suffered from Various Diseases and Infant Mortality

Disease	MORTALITY RATE							
	RURAL				HILLY			
	Neo-natal	Post Neo-Natal	Infant	Toddler	Neo-natal	Post neo-natal	Infant	Toddler
Fevers	22.05	132.30	154.35	29.38	25.91	196.89	222.80	45.45
Coughs	118.88	242.42	361.31	55.72	80.00	280.00	360.00	52.63
Digestive	38.23	166.67	204.89	35.50	25.21	184.87	210.08	34.12
Nervous	63.83	255.32	319.15	61.22	-	428.57	428.57	-
Circulatory	91.84	316.33	408.16	98.04	71.43	214.29	285.71	-
Others	348.45	235.05	583.51	97.51	90.91	472.73	563.64	51.09

Jaundice, Measles, Diabetes and Malnutrition), Circulatory disorders (such as Anaemia and Heart Trouble), Coughs (Pneumonia, Bronchitis, Asthma, Whooping Cough and Tuberculosis) and Nervous disorders (Convulsions, Meningitis and Paralysis). Except in the case of 'other' diseases in the Rural group, the impact of all these ailments had been very serious on children in the post Neo-natal stage and that in both the Rural and Hilly groups.

In the Rural group a significantly higher IMR was found among male children who suffered from various types of fevers and Nervous disorders (168.77 and 440.00 respectively) than

among the females (139.04) and 181.82 respectively). The IMR among those who suffered from coughs, digestive disorders, circulatory diseases and other diseases was higher among female children than among males in the same group. For example, the IMR among females was 423.57 as against 314.96 for males who suffered from different types of coughs; 205.88 as against 203.82 for males in case of digestive disorders; 434.78 as against 384.62 in case of circulatory diseases and 612.24 as against 564.01 for male children in case of other diseases.

In the Hilly group we find that the IMR among male children was higher in case they suffered from digestive disorders (287.67) and Nervous diseases (428.57) than among females (86.96 and 0.00 respectively). On the other hand, a very high IMR among females was found in case they suffered from various types of fevers (259.26), coughs (625.00) Circulatory disorders (333.33) and other diseases (750.00). In comparison, the IMR among male children who suffered from these diseases was 196.43, 235.29, 272.73 and 419.35 respectively.

Further, the IMR among the infants who were not affected by these diseases was significantly very low in both Rural (36.40) and Hilly (86.23) groups. The IMR was higher among children who suffered from these diseases and were not given any treatment (Rural 399.45, Hilly 203.89) than among those who were given treatment (Rural 302.86, and Hilly 271.57).

General Health Conditions

The general health of the child during the first and the second six months had a serious bearing on the mortality among infants and toddlers. From our enquiry we can make the following observations on the impact of general health conditions. The IMR was very high if the conditions of general health of children were below normal (Rural 525.42 and Hilly 392.86) or above normal (Rural 350.82 and Hilly 457.14) during the first six months. The impact of below normal health was more serious in the post-natal (Rural 322.03 and Hilly 339.29) than in the neo-natal (Rural 203.39 and Hilly 53.57) stage. The impact was also serious on toddlers as mortality rate among them was also found high (Rural 75.47 and Hilly 107.69). In the case of above normal health during the first six months the effect was found more serious on children at the neo-natal stage (Rural 255.74 and Hilly 385.71) than in the post neo-natal stage (Rural 95.08 and Hilly 71.43). The IMR among children with normal health was 101.46 in the Rural and 55.40 in the Hilly groups.

The effect of the general health conditions of children during the next six months, i.e. from 7th to 12th month, had also more or less similar trends. However, their effect on

infant mortality was less intensive during this period. The IMR among children with below normal health was 449.66 and 200.00 in the Rural and Hilly group respectively. The IMR among the children who had above normal health was 258.06 in the Rural and 173.23 in the Hilly population group. The IMR among the children with normal health was 80.04 in the Rural and 50.40 in the Hilly groups.

Another question relating to the child's general health in the first year was whether the child was gaining the weight in a normal way or the growth was below/above normal. In our enquiry, we analysed its relationship with mortality among children and found a very high mortality rate among infants (Rural 587.91, Hilly 350.65) and toddler (Rural 116.88, Hilly 90.91) in both the population groups if the growth in their weight was below normal during the first 6 months. The mortality rate among such children in the post Neo-natal stage was much higher than in the Neo-natal stage. However, in the Hilly group the IMR was much higher (441.44) among children whose growth in weight was above normal and the risk was found serious at the Neo-natal stage (364.86). The effect on the children in the Neo-natal stage in the Rural group was also similar (204.94) whereas the IMR (206.42) was considerably lower in comparison with children, whose gain in weight was below normal.

The mortality rate among the toddler group was very high in both the Rural (202.2) and Hilly (160.5) groups if the growth in their weight was below normal during the 7-12 months period. The IMR was significantly higher under this condition in both areas (Rural 395.35 and Hilly 185.19) as against among those whose growth in weight was above normal (Rural 251.53, Hilly 173.08). The IMR was found significantly low in both the areas in case the growth in weight during the two periods remained normal. In Table 19 we present the impact of weight growth on mortality rate.

Table 19 : Gain in Weight During the First Year of Birth and Infant Mortality

Gain in Weight	MORTALITY RATE							
	RURAL				HILLY			
	Neo-natal	Post neo-natal	Infant	Toddler	Neo-natal	Post neo-natal	Infant	Toddler
<u>In first 6 Months</u>								
Below Normal	230.77	357.14	587.91	116.88	90.91	259.74	350.65	90.91
Normal	21.45	92.95	114.40	24.29	6.23	61.39	67.62	17.50
Above Normal	204.94	81.48	286.42	56.73	364.86	76.58	441.44	58.82
<u>In 7-12 Months</u>								
Below Normal	69.77	325.58	395.35	202.19	74.07	111.11	185.19	160.49
Normal	30.82	65.07	95.89	25.10	11.24	33.71	44.94	11.99
Above Normal	120.36	131.17	251.53	22.47	85.58	87.50	173.08	41.20

The normal growth of child indicate existence of adequate level of resistance against a number of ailments and physical fitness. In this respect, we enquired about the period when the child started certain physical activities such as steadying neck, rolling, sitting, crawling, standing and walking. The ideal period for starting these activities is 2-3 months, 4-5 months, 6-7 months, 8-9 months, 10-11 months and 12-13 months respectively. We have analysed mortality rates in relation to the period of initiation of these activities, categorised as : the normal period, earlier than normal (below normal) or beyond normal period (above normal).

We find lowest mortality rate among infants who either started these activities without any support during the normal period or earlier. For both the two regions we found that the IMR among children who started steadying of neck during the normal period was lowest (Rural 120.70 and Hilly 63.26) as compared to those who started the activities earlier (Rural 157.89 and Hilly 75.86) or beyond the normal period (Rural 285.05, Hilly 267.29). The lowest IMR has been found among children who started rolling earlier than the normal period (Rural 73.17, Hilly 0.00) than among those who started the activity during the normal period (Rural 119.82, Hilly 43.86) or after (Rural 261.81, Hilly 195.25) it. Among the children who started sitting without support prior to the normal period in the Hilly group had IMR 0.00 while it

was 37.54 among children who started the activity during the normal period. In the Rural group, the IMR was lowest among children who started sitting during the normal period (99.46) while it was 113.64 among those who started the activity prior to this period. The IMR was considerably higher among children who started sitting after the normal period (Rural 242.87, Hilly 174.63).

Among the children who started crawling during the normal 8-9 months had lowest IMR in both the Rural (103.68) and the Hilly groups (39.47) while it was 120.88 in the Rural and 41.67 in the Hilly group if they started the activity earlier than this period. Among those who started this activity late, the IMR was significantly higher (Rural 229.03, Hilly 157.81).

The period when a child is normally expected to start standing without support is between 10 and 11 months. For both the regions we find a very low IMR among the children who started this activity prior to the normal period (Rural 50.00, Hilly 0.00). The IMR was found higher in the Hilly group (151.98) and the Rural group (218.40) if the children started this activity later than the normal period. The IMR among those children who started standing during 10-11 months was 213.68 in the Rural and 13.70 in the Hilly group.

With regard to walking, which usually starts during 12-13 months, we again find the lowest IMR among children who started the activity before the normal period (Rural 106.38, Hilly 0.00). In the Hilly group, a significantly lower IMR was found among children who started this activity during the normal period (30.30), as against among those who started the activity after the normal period (146.41). In the Rural group, however, the IMR was higher among those who started standing during the normal period (254.24) than among those who started walking after 13 months (214.81).

A significant aspect of the data in our findings is that the toddler mortality rate was found low among the children who started some of the above mentioned activities earlier than during the normal period. For example, in the Rural group, the mortality rate among the toddlers who started sitting (21.98), crawling (20.62) and walking (25.84) prior to the normal period was lower than those who started the activities during the normal period (30.38, 30.74 and 31.81 respectively). In the Hilly group, a significantly lower mortality rate was found in the group of toddlers who started steadying on neck (12.99), sitting (0.00) and walking (8.70) prior to the normal period than during the normal period (26.37, 16.79 and 16.06 respectively).

Malnutrition

Malnutrition among children is an obvious risk factor for their lives. Its effect has been found in both the population group, i.e. Rural and Hilly. In our study we asked a question about the malnutrition noticed by mothers in their children through symptoms such as : Pale skin/mucus membrane, absence of muscles under skin, beading of ribs, swelling on face and feet, discolouration or loss of hair and frequent colds and infections was also asked. In Table 20 we present their relationship between this deficiency and infant mortality and toddler mortality.

Table 20 : Malnutrition and Infant Mortality

Malnutrition/ Symptoms	MORTALITY RATE							
	RURAL				HILLY			
	Neo- natal	post Neo- natal	Infant	Todd- ler	Neo- natal	Post Neo- natal	Infant	Todd- ler
<u>Pale skin/Mucus Membrane</u>								
No	85.96	105.03	190.99	28.81	67.53	71.84	139.37	15.35
Yes	178.14	303.64	481.78	122.81	32.26	193.55	225.81	283.02
<u>Absence of Muscles under Skin</u>								
No	90.94	110.93	201.87	29.47	67.19	72.84	140.03	23.55
Yes	146.15	346.15	492.31	181.82	-	333.33	333.33	-
<u>Beading of Ribs</u>								
No	94.46	109.81	204.27	30.77	67.71	71.28	138.99	22.77
Yes	66.18	360.29	426.47	67.87	-	300.00	300.00	52.63
<u>Swelling on Face and Feet</u>								
No	92.25	113.26	205.52	29.46	67.98	67.98	135.96	22.36
Yes	127.91	383.72	511.63	186.05	36.36	236.36	272.73	42.74
<u>Discolouration/Loss of Hair</u>								
No	89.01	114.58	203.59	30.94	70.23	70.23	140.46	23.74
Yes	198.35	272.73	471.07	82.19	26.55	123.89	150.44	24.00
<u>Frequent Colds and Infections</u>								
No	100.07	108.87	208.94	29.82	69.25	70.78	140.03	25.03
Yes	47.03	200.50	247.52	46.07	36.70	119.27	155.96	12.20

Three important points that emerged from the data indicating relationship between symptoms of malnutrition and mortality are the following :

- (a) The IMR was very high among children who suffered from any of the symptoms of malnutrition, both in the Rural and Hilly groups;
- (b) More serious effect of this deficiency was found on a very large proportion of children in the post Neo-natal stage; and
- (c) Among the toddler group the mortality rate was found very high in the Rural population, if they had suffered from any of the symptoms of malnutrition earlier, while in the Hilly group the mortality rate among toddler was very high in case they had developed pale skin/mucus membrane and beading of ribs.

Further, a question 'whom do you normally consult on health problems' was asked with the objectives of (a) whether there is a tendency among mothers to consult some one if there is some problem with the child, and (b) whether there is any relationship between this tendency and infant mortality. We find the two population groups i.e., Rural and Hilly, had different pattern. In the Rural group, the highest IMR (333.33) was found in cases mothers consulted persons other than family members/relatives, followed by an IMR 290.32 where mothers consulted trained doctors or untrained medical persons (257.54). This may be probably because in a large number of cases the trained doctors were consulted when the health problems had become serious. In comparison to that the IMR was low where no one was consulted

(172.41). This may be because of the fact that the mothers were educated enough to tackle the problems themselves or the ailments were of minor nature.

In the Hilly group, on the other hand, no infant mortality case was reported where trained medical doctors were normally consulted which is followed by an IMR of 76.92 where untrained medical persons were consulted. The IMR was significantly higher in cases where either relatives were normally consulted (187.50) or no one (166.67).

The Role of Mass Media

The role of the mass media in providing useful information on common health problems and their remedies was also assessed and analysed in relation to infant mortality. In the Rural group we did not find any indication of a positive impact of the information provided by the Radio, Television and Hoardings/posters on infant mortality. In fact, the IMR was higher in the group of families where mothers felt that they received useful information on usual health problems from these sources. For example, in the Rural group, the mortality rates among the infants of mothers who thought of having received useful information about usual health problems and remedies through radio, television and hoardings/posters was 234.67, 268.29 and 215.69 respectively, while among those who thought otherwise the IMR was 200.63,

213.20 and 213.89 respectively. The IMR in relation to the opinion of mothers that they received useful information through news papers was slightly lower (207.55) than among those who did not think so (214.14).

In the Hilly group, on the other hand, the IMR was lower in the households where mothers thought of having received useful information through radio (133.61), television (122.30) news papers (81.97) and posters/hoardings (77.84) than among the group which thought otherwise (183.49, 143.30, 150.00 and 149.68 respectively). Films does not seem to have made any impact as the IMR in the group of mothers which considered films as useful in providing information was higher (159.09) than among those who considered otherwise (140.07). However, one is tempted to infer that **social and economic factors as also easy availability of medical facilities** seems to have greater bearing on the IMR than mere information about health care and facilities.

Participation in Socio-Economic Activities

The active participation of mothers in socio-economic activities of the household, women's association and the community was probed with the intention to know if they had any bearing on the infant mortality because it is presumed that the involvement in such activities was likely to enhance the health consciousness among mothers. In the

Rural group, active participation in the socio-economic activities of the household shows an adverse effect on the infants as the IMR in such cases was 221.67 as against 172.41 in case of non-participation. In the Hilly group, participation in such an activity shows positive impact as the IMR in this category was 130.65 as against 196.51 among those who did not participate. The opposite trend in the two settings, Rural and Hilly, probably indicate the differences in the nature and extent of participation of respondents in such activities.

The women participating actively in the activities of women's associations and the community reported low mortality rate among their infants in both the Rural (107.69 and 211.33 respectively) and the Hilly groups (90.13 and 80.68 respectively). In comparison, those who were not taking part in such activities reported higher IMR in both the Rural (216.17 and 214.37 respectively) and the Hilly (166.14 and 177.53 respectively) groups.

SOCIO-ECONOMIC RISK FACTORS

Age at marriage

The sample families in the Hilly population group had a lower percentage of currently married males (42.09) and females (48.22) than in the Rural population group (45.62

and 52.17 respectively). We find a larger proportion of women in the Rural group (68.29%) who were married at the age of upto 15 years while in the Hilly group only 17.16 per cent of the women were married during this age. The age of more than half of the women at marriage in the Hilly group (55.71 per cent) was between 16 and 18 and of over one-fourth (26.49 per cent) between 19 and 25 years. In the Rural group, the age at marriage of only 23.22 per cent of women was between 16 and 18 and that of 8.32 per cent between 19 and 25 years. Thus, we find a trend of early marriage in the Rural population as against the Hilly population. Another significant and distinctive feature of the two population groups is that the percentage of illiterates among males (55.33) and females (73.72) in the Rural group was much higher than in the Hilly group (31.51 and 57.10 respectively). Further, the percentage of educated persons at the Matric and above level in the Hilly group was also higher for male (21.17) and female (5.37) both as compared to the persons in the Rural group (9.51 and 2.96 respectively).

Parent's Education

We also explored the relationship between parent's education and infant mortality. We find the highest mortality among infants and toddlers if neither of the parents

were educated. The IMR and toddler mortality rate in this category of Rural population was 234.55 and 47.38 respectively, and in the Hilly group 156.46 and 37.97 respectively. In comparison to that we find the lowest IMR (183.04) and toddler mortality (21.44) rate in the Rural population if both the parents were educated, while in the case of only either of the parents being educated the IMR and Toddler mortality rates were 213.89 and 25.13 respectively. In the Hilly group, the IMR was higher (154.69) and toddler mortality low (15.73) in case both the parents were educated as compared to the IMR (112.09) and the toddler mortality rate (30.63) if either of the parents had education. It, therefore, seems that (a) illiteracy has some positive relation with infant and toddler mortality; and (b) the mere literacy does not affect the mortality among infants and toddlers, but probably the level of education of the parents help in reducing the IMR. It is probably the higher level of education and health consciousness that help in reducing the IMR whether it has been acquired by both or either of the parents.

Family Size

We find the families with larger number of children had low IMR than those with smaller number of children. And in this, the trend has been found similar in both the Rural as

well as Hilly groups. For example, in the Rural group, the IMR in the families having upto two children was 332.04 as against 155.79 where the number of children exceeded two. In the Hilly group also the IMR in the families with upto two children was 171.00 as against 123.16 where the number of children was more than two. This possibly indicate that the presence of smaller number of children in the families was the result of higher mortality among their infants.

The presence of elderly parents/grand parents in the family shows a negative relationship, though not strongly, with infant mortality. In the families where there were no parents/grand parent the IMR was found higher (Rural 218.31, Hilly 141.40) than among the households where one or more elderly persons were present (Rural 207.15, Hilly 140.56). This result points out two things : (a) the social custom that the elderly people take greater care of the infants, and (b) their experience in child rearing help in reducing various risks by taking precautionary measures, if the child fell ill or if the growth of the child is not normal.

Religion and Caste

Among the identified religions of the sample households, the Hindus in the Rural and Christians in the Hilly group had the highest IMR. In both cases mortality among the male

infants was higher (Rural (Hindu) 227.24, Hilly (Christian) 500.00) than among the female infants (Rural 208.91, Hilly 0.00). The mortality rates among the population of different Religious groups in the two sample areas are given in Table 21.

Table 21 : Religious Background and Infant Mortality

Religions	MORTALITY RATE							
	RURAL				HILLY			
	Neo-natal	Post neo-natal	Infant	Toddler	Neo-natal	Post neo-natal	Infant	Toddler
Hindu	92.61	126.19	218.81	33.62	64.52	72.77	137.28	23.17
Muslim	97.90	69.93	167.83	15.50	0.00	0.00	0.00	52.63
Christian	100.00	100.00	200.00	111.11	500.00	0.00	500.00	0.00
Buddhist	0.00	0.00	0.00	0.00	333.33	0.00	333.33	0.00
Others	333.33	0.00	333.33	142.86	98.36	147.54	245.90	33.33

The mortality rate among toddlers belonging to Muslim group in the Hilly and the Christian group and 'others' in the Rural population was found to be very high.

The relationship between caste and infant mortality indicate the highest IMR among the Scheduled Castes in the Rural and the Scheduled Tribes in the Hilly population group. The mortality in both the cases of Scheduled Tribes in the Hilly and the Scheduled Castes in the Rural group was

significantly higher at the post neo-natal stage. In the same caste groups, the mortality rate among toddlers was also significantly higher than among others. The Table 22 presents the details of the data on relationship between the two variables.

Table 22 : Caste and Infant Mortality

Castes	MORTALITY RATE							
	RURAL				HILLY			
	Neo-natal	Post neo-natal	Infant	Toddler	Neo-natal	Post neo-natal	Infant	Toddler
Scheduled Tribe	39.22	19.61	58.82	32.26	33.33	166.67	200.00	57.14
Scheduled Caste	100.00	130.89	231.64	42.67	76.92	76.92	153.85	25.32
Others	90.64	117.88	208.52	27.20	66.51	72.05	138.56	22.01

Among the Scheduled Caste infants of the Rural group, mortality rate for the males was found significantly higher (250.44) than for the females (209.78). Among the Toddlers, however, the position was different as the mortality rate for females was higher (53.83) than for the males (34.05). In the Hilly group, the mortality rate among female infants of the Scheduled Tribes was 400.00 as against 100.00 for the male infants and 66.67 for the female toddlers as compared to 50.00 for the male toddlers.

Landholdings, Milch Cattle and Poultry

The ownership of agricultural land in the rural setting is a source of economic security for a large proportion of population. The degree of security depends on the size of the landholdings one owns. The possession of milch cattle and poultry birds helps in supplementing income through sale of milk and eggs. If they grow vegetables on their own land, it adds to their dietary quality.

In the Rural group we find the highest IMR (250.00) among the families of big farmers owning more than two hectare of agricultural land followed by the households having no land (244.27). In comparison, the marginal and small farmers' families (with less than one hectare and between one and two hectare) had IMR 203.22 and 192.39 respectively.

In the Hilly group the highest IMR was found among the households of the small farmers (200.00) followed by those without landholdings (189.19). The IMR among the marginal farmers (120.00) was found lower than among the big farmers (166.67). However, mortality rate among toddlers belonging to landless households was found higher in both the Rural (41.12) and the Hilly (45.23) groups. The data from the two population groups, therefore, does not indicate any relationship between size of landholdings and infant mortality.

The ownership of milch cattle and poultry birds have shown a negative relationship with infant mortality in both the Rural and the Hilly groups. The data is presented in Table 23.

Table 23 : Ownership of Milch Cattle and Poultry Birds and Infant Mortality

Milch Cattle/ Poultry Birds	MORTALITY RATE							
	RURAL				HILLY			
	Neo- natal	Post neo- natal	Infant	Todd- ler	Neo- natal	Post neo- natal	Infant	Toddler
<u>Milch Cattle</u>								
None	128.71	112.21	240.92	34.75	36.72	73.17	159.89	14.58
1-2	77.22	124.84	202.06	32.23	66.56	79.55	146.10	34.66
More than 2	82.21	122.57	204.78	31.91	50.23	68.49	118.72	14.29
<u>Poultry Birds</u>								
None	93.28	121.78	215.06	33.00	72.11	75.28	147.39	26.72
Upto 5	111.11	92.59	203.70	38.46	27.03	72.07	99.10	5.85
More than 5	65.79	118.42	184.21	14.08	20.00	60.00	80.00	11.24

We stated earlier that the possession of milch cattle and poultry birds helps in supplementing income and also in maintaining health of the members of households. In fact, those who had a kitchen garden reported larger proportion of infant mortality cases than those who did not have it. In

the case of ownership of a kitchen garden, those having it had an higher IMR, in both the Rural (258.02) and Hilly groups (159.49), than those who did not have it (Rural 199.15, Hilly 97.26). The toddler mortality was also found comparatively higher among those who had a kitchen garden (Rural 56.36, Hilly 21.52) than those who did not (Rural 27.53, Hilly 21.43) have it. Thus, it is the opportunity to use milk and eggs freely that probably help in maintaining the adequate health of the infants and mothers, if one does not have to buy them from the market. Such a situation has been found related to a lower IMR in both the Rural and the Hilly groups.

Housing Conditions

Ownership of the house indicate the economic status as well as the socio-economic security that the family enjoy. In the Hilly group ownership of the house does not reflect any impact on infant mortality, e.g., those who owned a house had the IMR 141.30 as against the IMR 140.74 among the families living in rented houses. In the Rural group, however, we find a lower IMR (212.61) among the owners of their houses as against those living in rented houses (240.00).

The families living in kutchha houses had a significantly higher infant mortality rate than those living in pucca houses.

The mortality rate among toddlers was also higher among the households residing in kutchha houses. The Table 24 presents the comparative position of the two regions in this respect.

Table 24 : Structure of House of the Families and Infant Mortality

Type of house	MORTALITY RATE							
	RURAL				HILLY			
	Neo-natal	Post neo-natal	Infant	Toddler	Neo-natal	Post neo-natal	Infant	Toddler
Kutchha	97.41	123.34	220.75	38.51	120.00	182.86	302.86	59.94
Semi-kutchha	90.31	130.76	221.07	25.79	34.86	54.47	89.32	17.27
Pucca	81.33	75.30	156.63	26.51	73.51	62.10	135.61	14.25

Generally, the kutchha houses were small, mostly in the form of huts, without sufficient space for the household members. The insanitary conditions in and around such houses contribute significantly to health hazards. The highest IMR among the residents of such houses was, therefore, natural. The congested small houses with a kutchha or semi-kutchha structure and having just one or two rooms without necessary facilities was also found a factor contributing to a higher infant mortality. In Table 25 we present the relationship between housing conditions as indicated by number of rooms and other facilities available to their occupants and infant mortality.

Table 25 : Housing Conditions and Infant Mortality

Conditions of Housing (faci- lities avail- able)	MORTALITY RATE								
	RURAL				HILLY				
	Neo- natal	Post Neo- natal	Infant	Todd- ler	Neo- natal	Post Neo- natal	Infant	Todd- ler	
	1	2	3	4	5	6	7	8	9
<u>No. of Rooms</u>									
1.		91.63	135.46	227.09	45.30	61.40	131.58	192.98	15.63
2		139.15	115.26	254.41	35.44	94.10	79.34	173.43	22.93
3		72.60	147.54	220.14	33.49	59.75	53.46	113.21	32.41
3+		65.22	98.81	164.03	25.22	38.64	65.91	104.55	20.33
<u>Cross Ventilation</u>									
Insufficient		109.02	122.96	231.98	33.79	87.16	104.60	191.76	33.82
Sufficient		75.62	118.16	193.79	31.91	50.63	50.63	101.27	12.96
<u>Separate Kitchen</u>									
No		100.44	109.17	209.61	33.26	64.01	65.06	129.07	27.12
Yes		83.08	136.92	220.00	32.22	72.34	93.62	165.96	17.42
<u>Indoor Smoke</u>									
Mild		103.53	105.78	209.30	25.52	66.43	76.92	143.36	29.35
Moderate		80.05	123.74	203.77	34.64	49.20	70.91	120.12	19.13
Severe		113.64	172.08	285.71	48.28	144.65	75.47	220.13	14.22
<u>Latrine</u>									
Open		97.17	123.32	220.49	34.17	65.49	76.27	141.76	22.39
Pit		59.52	99.21	158.73	26.18	97.22	41.67	138.89	11.76
Flush		40.00	80.00	120.00	16.39	56.60	75.47	132.08	133.33
<u>Garbage Disposal</u>									
Near		106.54	121.87	228.41	30.89	71.07	76.03	147.11	39.56
Away		84.61	120.04	204.65	34.17	62.58	73.62	136.20	11.71

Table 25 (Contd....)

	1	2	3	4	5	6	7	8	9
<u>Water Drainage</u>									
Open/Stagnant	95.47	130.86	226.34	34.83	76.67	76.67	153.33	24.73	
Open Running	88.01	109.69	197.70	26.69	55.28	73.70	128.98	23.94	
Closed	110.14	136.23	246.38	51.66	72.07	72.07	144.14	20.00	
<u>Source of Drinking Water</u>									
Fond/Tank	130.43	43.48	173.91	38.46	45.32	72.51	117.82	16.39	
Stream/River	28.57	114.29	142.86	00.00	54.88	91.46	146.34	28.36	
Well	97.35	122.91	220.26	37.73	135.96	118.42	254.39	27.78	
Handpump	83.33	117.89	201.22	24.62	00.00	200.00	200.00	76.92	
Tap	173.91	130.43	304.35	37.04	58.60	45.37	103.97	22.40	
<u>Water Filtered</u>									
No	93.69	117.21	210.90	32.24	68.99	78.29	147.29	21.19	
Yes	91.76	145.88	237.65	37.16	40.98	40.98	81.97	50.00	
<u>Water Supply Problem</u>									
No response/No Problem	93.91	115.19	209.10	23.96	31.19	70.69	101.87	13.62	
Difficult Access	88.96	124.04	213.00	38.98	72.80	72.80	145.60	29.50	
Acute Shortage	85.94	164.06	250.00	50.85	56.82	11.36	68.18	37.04	
Poor Maintenance	116.28	106.31	222.59	38.04	180.95	152.38	333.33	42.25	
Contamininity	103.45	68.97	172.41	0.00	0.00	200.00	200.00	0.00	
Others	0.00	0.00	0.00	0.00	272.73	0.00	272.73	0.00	
<u>Source of Lighting</u>									
Oil Lamp	94.51	123.70	218.21	38.53	86.25	94.34	180.59	39.50	
Lantern	98.27	128.51	226.78	28.01	55.56	104.17	159.72	22.22	
Electric Bulb	58.48	52.63	111.11	13.61	59.45	52.84	112.29	16.22	
<u>Fuel for Cooking</u>									
Waste	93.13	148.61	241.74	39.60	66.67	200.00	266.67	20.41	
Coal	118.42	65.79	184.21	21.58	23.26	46.51	69.77	0.00	
Firewood	91.89	97.30	189.19	26.26	61.52	73.46	134.99	26.56	
Gas	100.00	0.00	100.00	69.77	88.89	66.67	155.56	0.00	
Kerosene	160.00	120.00	280.00	0.00	94.79	71.09	165.88	27.32	
Electricity	0.00	0.00	0.00	0.00	200.00	0.00	200.00	0.00	

We have earlier presented the relationship between structure of the house and infant mortality in Table 24. In Table 25 we have presented the Mortality Rates in relation to a number of conditions in which the sample population was living. These conditions include : number of rooms in the house, cross ventilation, separate kitchen indoor smoke, type of latrine, garbage disposal facility, type of water drainage, source and type of drinking water, problems in water supply, source of lighting and type of fuel used for cooking.

Out of the twelve conditions listed in the Table we find similarity in the trends of relationship between infant mortality and five of the conditions in both the Rural and Hilly groups. They included : cross ventilation, indoor smoke, type of latrine, place of garbage disposal and water drainage system.

The IMR was found highest in both Rural and Hilly groups, if cross ventilation in the house was insufficient (Rural 231.98, Hilly 191.76), indoor smoke was severe (Rural 285.71, Hilly 220.13), latrine was open (Rural 220.49, Hilly 141.76) and place of garbage disposal was near the house (Rural 228.41, Hilly 147.11). The IMR in both the sample groups was found lowest if water drainage was running open, (Rural 197.70, Hilly 128.98).

Tap, as a source of drinking water in the Rural and 'Well' in the Hilly group were found associated with the highest IMR in their respective areas. It seems that the proper chlorination and filtration of tap water in the rural areas was not done and the wells were not periodically cleaned. Lantern as a source of lighting in the rural and oil lamp in the Hilly areas were found associated with a high IMR (Rural 226.78, Hilly 180.59). The use of Kerosene as a fuel for cooking in the Rural areas and waste in the Hilly areas indicate a relationship with higher IMR in their respective areas.

The analysis of data indicate that (a) the polluted environment and insect breeding inside and around the house which causes certain respiratory infection and diarrhoeal diseases were probably responsible for a higher IMR, and (b) the conditions of supply of drinking water were highly unsatisfactory in respect of tap water in the rural and well-water in the Hilly areas. The tap water in the Rural areas, it seems, was not properly chlorinated and filtered and the wells in the Hilly areas were not properly maintained. Thus, the supply of polluted drinking water was responsible for diarrhoeal diseases as well as respiratory disorders among infants, particularly in their neo-natal stage.

Household Assets

The possession of household assets indicate the life style besides one's economic status which made us cover this aspect also in our enquiry. The list of items in the interview schedule included : Winter clothes, quilts/blankets, mosquito nets, watch/clock, radio/transister, bicycle, motor cycle/scooter and first aid/common medicines. The first three items were necessary for protection against cold and mosquitoes, responsible for a number of fevers, such as influenza, malaria and typhoid and coughs such as pneumonia, bronchitis, asthma and whooping cough. For their protection against such risks adequate winter clothes, quilts/blankets and mosquito nets were necessary. The next four items may not be directly concerned with health but their possession indicate the style and status of living. Keeping the first aid/common medicines indicate not only the consciousness about their necessity but also the knowledge about some of the medicines and their usage. In Table 26, we present the relationship between the availability of the above mentioned items and infant mortality.

We find that the families in the Rural group with insufficient winter clothes and quilts/blankets had a higher IMR (253.37 and 263.02 respectively), while in the Hilly group, families without these items had a higher IMR (333.33 and 200.00 respectively) than those who had insufficient quantity

Table 26 : Household Assets/Durables and Infant Mortality

Assets	MORTALITY RATE							
	RURAL				HILLY			
	Neo-natal	Post neo-natal	Infant	Toddler	Neo-natal	Post neo-natal	Infant	Toddler
<u>Winter Clothes</u>								
No	96.39	132.53	228.92	32.26	142.86	190.48	333.33	0.00
Insufficient	104.65	148.71	253.37	41.41	68.53	88.83	157.36	40.18
Sufficient	80.98	87.49	168.47	25.72	65.79	65.79	131.58	18.58
<u>Quilts/Blankets</u>								
No	86.96	91.79	178.74	41.10	66.67	133.33	200.00	0.00
Insufficient	112.63	150.39	263.02	40.50	64.77	95.85	160.62	45.54
Sufficient	74.02	92.52	166.54	24.49	68.09	66.06	134.15	15.08
<u>Mosquito Nets</u>								
No	109.15	130.28	239.44	42.80	61.91	52.53	114.45	25.72
Insufficient	67.70	131.17	198.87	20.54	57.64	105.26	162.91	35.29
Sufficient	65.66	55.56	121.21	22.45	80.41	71.27	153.67	10.53
<u>Watch/Clock</u>								
No	92.72	113.96	213.68	43.48	81.48	133.33	214.81	89.82
Yes	91.00	125.24	216.24	28.02	65.00	67.35	132.34	16.68
<u>Radio/Transistor</u>								
No	97.83	122.29	220.13	38.07	79.37	126.98	206.35	74.47
Yes	90.80	121.47	212.27	28.62	66.56	69.73	136.29	17.71
<u>Bicycle</u>								
No	115.60	130.28	245.87	42.15	64.17	71.05	135.22	25.75
Yes	82.79	117.41	200.20	28.24	97.83	119.57	217.39	12.05
<u>Motor Cycle/Scooter</u>								
No	91.89	122.30	214.19	32.48	60.79	73.39	134.17	25.16
Yes	145.30	102.56	247.86	46.51	243.24	108.11	351.35	0.00
<u>First Aid/Common Medicine</u>								
No	96.21	124.35	220.56	31.64	68.55	79.84	148.39	27.66
Yes	60.00	80.00	140.00	63.41	38.71	32.26	70.97	0.00

of these items. The non-availability of mosquito nets in the Rural group and their insufficient number in the Hilly group has been found associated with higher IMR. This, probably, indicate the weather conditions of the two geographical regions. Those households who do not keep first aid/common medicines in their houses had a higher IMR in both the Rural (220.56) and Hilly (148.39) groups than those who were in the habit of keeping them. The non-availability of a radio/transister in the households was associated with a higher IMR in both the Rural and Hilly groups. However, from this it is difficult to indicate that it is because the population could not get sufficient information on health problems and their remedies due to lack of it. For, on an earlier question relating to the role of mass media in providing information on health problems, we had found a higher IMR among those in the Rural group who had received such information through radio.

Household Income and Expenditure

The most important and direct indicator of the economic status of a family is the income it derives through different sources. The source of earning indicate both the social and economic status the family occupies in the society. In this section, therefore, we present the relationship between infant mortality and occupation and the quantum of earnings

of the household. In Table 27 we present an analysis of the relationship between sources of earnings of the households and infant mortality.

Table 27 : Sources of Earnings of the Household and Infant Mortality

Source	MORTALITY RATE							
	RURAL				HILLY			
	Neo-natal	Post neo-natal	Infant	Toddler	Neo-natal	Post neo-natal	Infant	Toddler
Wage labour	113.12	140.79	253.91	50.82	50.36	115.11	165.47	29.13
Agriculture	66.09	99.13	165.22	22.58	79.53	72.16	151.69	20.02
Artisan	83.33	194.44	277.78	14.93	90.91	0.00	90.91	0.00
Business	51.72	51.72	103.45	17.54	44.78	29.85	74.63	72.46
Service	27.78	83.33	111.11	18.52	63.67	74.91	138.58	27.03
Others	200.00	0.00	200.00	1000.00	111.11	0.00	111.11	0.00

In the Rural population group we notice the highest IMR was among the artisan families followed by the wage labour. Among them mortality at the post neo-natal stage was significantly higher than at the neo-natal stage. We also noticed a higher mortality rate among the toddlers belonging to the wage labour households. Another significant aspect of the data is that we find a significantly higher IMR among male children of the wage labour (273.13) and artisan (466.67)

households than among their female children (230.77 and 142.86 respectively).

In the Hilly group, we find the IMR was higher in families of wage labour and cultivators (Agricultural). Among the wage labour families post neo-natal mortality was significantly higher. In this group of households mortality rate among female infants was significantly higher (181.82) than among the male infants (150.68). A higher IMR among the artisan and wage labour families in the Rural group and wage labour and agricultural families in the Hilly population group may possibly be due to the women's employment in these occupations. It is probably due to this characteristic that post neo-natal mortality was found higher than the neo-natal mortality. The children in the neo-natal stage are generally taken care of by their mothers themselves within their homes while in the post Neo-natal stages they are generally looked after by others in the family, if their mothers were working. In the absence of proper arrangement to look-after them, the infants were naturally neglected.

In Table 28 we present the relationship between monthly earnings of the household and infant mortality.

Table 28 : Monthly Household Earnings and Infant Mortality

Earnings (Rs.)	MORTALITY RATE							
	RURAL				HILLY			
	Neo- natal	post neo- natal	Infant	Toddler	Neo- natal	Post neo- natal	Infant	Toddler
Upto 500	109.99	145.82	255.81	42.50	104.27	118.48	222.75	43.48
501-1000	81.53	101.52	183.05	22.11	50.74	69.77	120.51	19.00
1001-2000	68.49	54.79	123.29	28.85	101.35	60.81	162.16	18.63
Above 2000	71.43	71.43	142.86	125.00	333.33	0.00	333.33	0.00

In the Rural group, we find the lower income families had the highest IMR. In the Hilly group, due to a very small number of births (3) the IMR was found highest even on the single death in the income group of above 2000. If we ignore this group the IMR in the lowest income group becomes most significant. The trend, i.e. lower the monthly earnings of the households highest the IMR, supports the explanation presented in respect of the sources of earnings, that it was probably due to the mother's engagement in employment that the infants, particularly in the post neo-natal stage, were neglected. However, it is difficult to explain the high rate of toddler mortality (125.00) among the highest income earning families in the Rural group.

The relationship between monthly household expenditure and infant mortality in the two population groups was not uniform. In the Rural group lowest the monthly expenditure highest the IMR was found. The trend was consistent. However, in the Hilly group the relationship between the two variables was not clear. We present the data in Table 29.

Table 29 : Monthly Household Expenditure and Infant Mortality.

Expenditure (Rs.)	MORTALITY RATE							
	RURAL				HILLY			
	Neo-natal	Post neo-natal	Infant	Toddler	Neo-natal	Post neo-natal	Infant	Toddler
Upto 500	122.92	145.53	258.45	41.69	95.06	91.25	186.31	46.63
501-1000	72.99	96.31	169.30	22.73	49.31	71.01	120.32	16.45
1001-2000	60.15	67.67	127.82	31.06	132.35	73.53	205.88	21.58
Above 2000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

In the Hilly group, the highest IMR was found among the households who spent between Rs.1001-2000 per month on various items, such as, food, education, medical care, clothing and others. In this group of families, the mortality rate in the neo-natal stage was considerably high.

In the Rural population group we have found a consistently negative relationship between monthly household expenditure and the IMR. The IMR declines as the amount of monthly

expenditure increases. The mortality rate among children in the post Neo-natal stage was higher than in the Neo-natal stage.

Infant Mortality and Fertility

In this section we have examined the relationship between infant mortality and fertility behaviour of our respondents. The questions asked to know the intentions/behaviour of the respondents included: did you become pregnant after the birth of the index child (born in the last two years)? How many children do you want to have in all (boys, girls and total)?, Is it necessary to have a child in place of the one that dies within a year of life?, Is it necessary to have more children to ensure that the desired number of children will survive?, Do you think the chances of child survival are increasing, decreasing or remaining the same in the last five years?, and, which family planning method will you prefer in order not to have additional children?

In both the Rural and Hilly population groups, we find a high IMR on these occasions: (a) when mothers became pregnant after the birth of the index child; (b) when mothers considered it necessary to have a child in place of the one that dies within a year of life; and (c) when none of the family planning methods were preferred. In the case

of questions relating to the number of children desired, more children to ensure that the desired number of children will survive, and chances of child survival in the last five years, the pattern of responses was different in the two population groups (Rural and Hilly). The data pertaining to the above questions is presented in the following Tables.

Table 30 : Mothers' Became Pregnant After the Birth of Index Child and Infant Mortality

Pregnancy	MORTALITY RATE							
	RURAL				HILLY			
	Neo-natal	Post neo-natal	Infant	Toddler	Neo-natal	Post neo-natal	Infant	Toddler
No	92.44	119.05	211.48	33.95	62.64	70.94	133.58	23.16
Yes	101.89	135.85	237.74	22.56	134.83	123.60	258.43	31.45

As compared to the average IMR among the Hilly population group we find a significantly higher IMR in case mothers became pregnant after the index child. The IMR among females was very high (346.94) as compared to mortality rate among male infants (150.00). In the rural group the IMR was higher, in case mothers became pregnant, though not as significantly higher as in the Hilly group. In this sample population the mortality rate for male infants (266.67) was considerably higher than for the female infants (200.00).

The Table 31 present the relationship between infant mortality and the feeling to have a child for the dead child.

Table 31 : Have a Child for Dead Child and Infant Mortality

Response	MORTALITY RATE							
	RURAL				HILLY			
	Neo-natal	Post Neo-natal	Infant	Toddler	Neo-natal	Post Neo-natal	Infant	Toddler
No	85.64	100.73	186.37	28.33	59.61	66.91	126.52	30.10
Yes	107.68	158.24	265.92	41.67	76.92	83.61	160.54	16.65

The relationship between the desire to have a child to substitute the one that died during infancy indicate a higher IMR, and this is significantly so in the Rural group. The toddler mortality was also higher in this population group. In the Rural group, the mortality rate for male infants was very high (291.10) as compared to the mortality rate for females. In the Hilly group, however, a higher mortality rate among female infants (176.90) was found than among male infants (141.99).

The relationship between the methods preferred for family planning and infant mortality has been examined in Table 32.

Table 32 : Family Planning Methods Preferred and Infant Mortality

Method Preferred	MORTALITY RATE							
	RURAL				HILLY			
	Neo-natal	Post neo-natal	Infant	Toddler	Neo-natal	Post neo-natal	Infant	Toddler
None	92.59	129.63	222.22	32.26	11.76	164.71	176.47	35.46
Spacing	94.58	122.52	217.10	32.52	69.38	69.38	138.76	22.92
Terminal	56.07	65.42	121.50	45.45	166.67	0.00	166.67	0.00

Those who did not prefer any family planning method were found associated with a higher IMR in both the Rural and Hilly groups. Among them the post Neo-natal mortality was significantly higher than at the Neo-natal stage. In the Rural group the mortality rate among female infants was very high (333.33) as against males (179.49). In the Hilly group the position was reversed and the mortality rate among male infants was about three times higher (250.00) than among female infants (81.08).

The desire for the number of children, male, female and total had a different pattern of relationship with infant mortality in the two population groups. We find the desire for a larger number of boys in Rural group was associated with a higher IMR while in the Hilly group a higher IMR was found associated with the desire for only one

boy. The lowest IMR was found in both the Rural and the Hilly groups when mothers desired for three girls. In Table 33 we present the relationship between infant mortality and the desire for the number of children mothers wanted.

Table 33 : Desire for the Number of Children and Infant Mortality

Children desired (No.)	MORTALITY RATE							
	RURAL				HILLY			
	Neo- natal	Post neo- natal	Infant	Toddler	Neo- natal	Post neo- natal	Infant	Toddler
<u>Boys</u>								
One	60.87	81.16	142.03	21.93	33.83	77.84	151.68	10.53
Two	102.42	101.15	203.56	26.64	65.53	75.24	140.78	28.02
Three	88.07	157.80	245.87	37.45	40.82	71.43	112.24	25.09
<u>Girls</u>								
One	103.99	112.26	216.25	29.71	60.57	83.45	144.01	22.70
Two	89.44	141.71	231.21	31.17	85.65	67.13	152.78	33.46
Three	58.56	103.60	162.16	53.41	85.27	46.51	131.78	6.37
<u>Total Children</u>								
One	24.39	48.78	73.17	20.41	23.26	93.02	116.28	15.87
Two	114.75	131.15	245.90	40.00	67.62	71.17	138.79	18.37
Three	100.71	83.42	184.13	23.57	63.79	88.48	152.26	21.51
Four	87.29	141.30	228.59	37.20	72.04	63.46	135.51	28.17

We find that the desire for a larger number of boys (3) was associated with a higher IMR (245.87) in the Rural group while in the Hilly group the higher IMR was found among the families wanting to have only one son. The group of mothers wanting two daughters had the highest IMR in both the Rural

and Hilly populations. The desire to have a total of two children in the Rural and three children in the Hilly group was associated with a higher IMR.

The significant point in the analysis of data was the fact that in the Rural group a considerably higher mortality rate among female children (261.06) was found than among the male children (235.11) in the families wanting to have three sons. In the case of the desire for the number of girls, the mortality rate was highest among the households wanting to have two girls. In such a group of families mortality rate among boys (257.69) was higher than among girls (205.27). The psychology behind this trend of the desire was, probably, to replace the dead child with a child of the opposite sex.

In the Hilly group, however, the trend was different. The highest IMR was found in the families where mothers desired for only one son. In such families mortality rate among male infants was nearly double (209.04) the mortality rates among female infants (108.28). The families wanting to have two girls had the highest IMR. In such households mortality rate among female infants was higher (164.56) in among the male (138.46) infants. The lowest IMR was found among the families wanting three girls and among such families the mortality rate for the male children (185.19) was higher than for female (93.33) children.

As regards the total number of children desired in the family we find the highest IMR (245.90) and toddler mortality (40.00) in such Rural households where mothers wanted only two children. The desire for only one child was found associated with the lowest IMR (73.17). In the Hilly group, the highest IMR was associated with the desire for a total of three children and the lowest IMR with the desire for only one child.

The association of the lowest IMR with the desire of mothers for only one child, in both the Rural and Hilly groups, was probably due to their belief that they can take proper care of one child; that they can afford his/her requirements; and, that the large size families experience infant mortality more than the small size families.

The analysis of the question regarding the chances of child survival in the last five years shows that the association of its replies with infant mortality was not clear, particularly in the Rural group. Those who felt the chances of survival remained the same were associated with highest IMR (325.00) while those who believed the survival chances were decreasing were associated with the lowest IMR (210.50). In comparison, the households believing the chances had increased had an IMR of 246.38.

In the Hilly group, mothers who believed that the survival chances of children were decreasing had highest IMR (157.66) in their families while those who believed the chances remained the same had the lowest IMR (78.26) in their households. In comparison, those who felt the survival chances of children were increasing were associated with an IMR of 129.03, much higher than among those felt the chances remained the same.

To the question 'is it necessary to have more children to ensure that the desired number of children will survive?', those who responded positively had experienced a greater proportion of cases of infant mortality in the Rural group. The analysis is presented in Table 34.

Table 34 : More Children for the Survival of Desired Number of Children and Infant Mortality.

More Children	MORTALITY RATE							
	RURAL				HILLY			
	Neo- natal	Post neo- natal	Infant	Toddler	Neo- natal	Post neo- natal	Infant	Toddler
No	80.70	89.09	169.79	26.21	71.79	71.79	143.59	18.71
Yes	104.89	153.80	258.69	37.56	63.73	75.49	139.22	26.12

In the Hilly group, on the other hand, the differences in the IMR of those who responded the question either negatively or positively had not much difference in the IMR. The trend, however, was that those who wanted more children had a lower IMR than those who did not.

The differences in the IMR among the Rural group families who wanted more children and who did not want were significantly wide. A significantly high IMR among the families desiring for more children indicate that their desire was based on their experience of high infant mortality.

CHAPTER V

Summary and Conclusions

The present study is based on the survey of two population groups of the state of Uttar Pradesh, namely, Rural (of the plains) and Hilly. In the Rural population group the survey was conducted in five districts, namely, Basti, Sultanpur, Etawah, Rae Bareilly and Banda representing the eastern, western, central and Bundelkhand regions of the state. In the Hilly group, three districts, namely, Almora, Pithoragarh and Tehri Garhwal were selected. The study is based on the survey of 11,419 households of 86 villages in the Rural and 8,572 households of 112 villages in the Hilly areas. The field work for the study was conducted between January and June 1987. On the basis of the present survey we found that the IMR (Infant Mortality Rate) in the Rural area was 213.9 (218.93 for males, 208.04 for females) and in the Hilly area 141.3 (141.41 for males, 141.05 for females). In the Rural sample, the district Etawah had the lowest IMR (85.71) followed by Banda (179.31), Basti (187.25), Rae Bareilly (258.99) and Sultanpur (295.70). In the Hilly districts, Almora had a significantly low IMR (61.54) followed by Tehri Garhwal (184.08) and Pithoragarh (189.62).

On the basis of the SRS data from the Registrar General of India, the Directorate of Family Welfare, Uttar Pradesh (1987) reported that the Infant Mortality Rate in U.P. during 1985 was 140 as against 95 in the country. The present survey of the eight districts covering the Hilly region and

the plains of the state indicates that the IMR for the combined population of the two areas was 191.22 (194.2 for males and 187.65 for females).

A significantly higher IMR was found in the Rural Population Group (213.92) as compared to the IMR in the Hilly group (141.25). Our data also indicated :

- (a) a higher IMR among male as compared to the female children in the Rural Group, while it was almost equal in the Hilly group;
- (b) mortality rate at the Post-Neo-natal stage was higher than at the Neo-natal stage in both the population groups;
- (c) mortality rate among female children was significantly lower than males at the Neo-natal stage but it exceeded the mortality rate among males at the Post-Neo-natal stage in both the population groups; and
- (d) mortality rate among the toddlers was low as compared to the mortality rate among infants, however, in the two population groups it was higher in the Rural group as compared to the Hilly group.

In the Rural Population Group, the highest Infant Mortality Rate was found in one of the two districts from the Eastern region of the state namely, Sultanpur (295.70), followed by Rae Bareilly (258.99) of the Central, Basti (187.25) in

IMR increased sharply when mother's age at child birth was in between 26-35 years (Rural 225.3 and Hilly 165.4).

The relationship between birth order and infant mortality and that between preceding birth interval and infant mortality indicate that in the Rural Group the IMR was lowest at the second-order births (149.7) which increased to 241.7 and 243.2 at the third and fourth order births. The IMR was lowest (167.6) when the preceding birth interval was above 36 months and highest (247.9) when the interval was that of upto 24 months.

In the Hilly group, however, the lowest IMR was found at the first order births (105.0) which consistently increased to 210.5 at the fifth order births. The lowest IMR was found when the preceding birth interval was only upto 24 months (108.5).

The IMR seems to have a positive relationship with complications experienced by mothers during the pregnancy period. In this respect it has been found that the IMR was very high in the Hilly group (571.4) as compared to the Rural group (246.9). Most cases of death under these conditions were reported in the Neo-natal stage. The incomplete term of pregnancy was also found to be related to a higher IMR more significantly in the Rural Group (486.7) than in the Hilly Group (160.1). A very high IMR was also recorded when mothers had experienced previous pregnancy losses. In the later cases, the IMR in the Hilly Group (567.9) was much higher than in the Rural Group (271.3).

the Eastern, Banda (179.31) in the Bundelkhand and Etawah (85.71) in the Western region.

In the Hilly Population Group the highest IMR was found in district Pithoragarh (189.62) followed by Tehri Garhwal (184.08) and Almora (61.54).

Thus, the present study indicates a high Infant Mortality Rate, which is particularly pronounced in the Rural Population Group. Comparing with the SRS data we find a very high IMR in four out of the five districts of the plains and two out of the three districts of the Hill region of Uttar Pradesh.

(A) Critical Factors

The study examined the contribution of a number of risk or causative factors which could be critical at the pre-natal, natal, post-natal stages. Besides this, the study also looks into socio-economic risk factors and fertility behaviour.

(i) Pre-natal Risk Factors : Under this category the relationship between certain maternal attributes and infant mortality was analysed. The highest IMR was recorded when mother's age at child birth was upto 18 years (281.8 in Rural and 163.6 in Hilly) while it was lowest when mothers were in between 19 and 25 years (Rural 194.6 and Hilly 123.9). The

The relationship between a number of diseases the mothers suffered from during the index pregnancy and infant mortality was also examined. It was found that in the Rural Population Group the mothers who suffered from Hypertension had reported a very high mortality rate (833.3) among their infants as against those who did not suffer from this ailment (211.5). This is followed by Heart diseases (384.6 as against 213.2 in case mothers did not suffer), Oedema (365.5 and 206.6), Accident/injury (359.0 and 202.2), Convulsions (325.7 and 207.3), Diabetes (304.4 and 213.3), Malaria (283.0 and 211.5), Anaemia (258.1 and 213.0), Palour (256.4 and 184.4), Tuberculosis (235.29 and 213.69) and Renealinfection (230.8 and 213.7).

In the Hilly Population Group the relationship between mother's ailments during the index pregnancy and infant mortality shows that all the children died during their infancy if their mothers suffered from Reneal infection. The IMR in our sample was 666.7 if mothers suffered from Oedema while it was 133.6 in case the mothers did not suffer from this disease. The IMR was 234.0 in case mothers suffered from Anamia as against 137.1 if they did not suffer while the IMR was 228.6 in case mothers suffered from Convulsions (135.7 if did not); 220.2 in case of Malaria (125.9 if did not); 196.3 in case of German Measles (135.8 if did not); 173.6 in case of accident/injury (137.2 if did not);

and, 145.4 in case mothers suffered from Palour (131.6 if did not suffer).

Comparing the effect of certain ailments during pregnancy we can adduce to the following :

- (a) some ailments of mothers during the index pregnancy had no significantly adverse effect on the survival of children. For example, German Measles did not show any significant impact on IMR in the Rural and Heart disease, Tuberculosis, Diabetes and Hypertension in the Hilly Population Group; and
- (b) in the Rural population Group the mother's ailments such as Oedema, Heart diseases, Hypertension and Anaemia were found associated with a higher IMR at the Neo-natal stage while Palour, Convulsions, Malaria, Tuberculosis, Diabetes and injury were related with an higher IMR at the post Neo-natal stage.

In the Hilly Group, the mothers' ailments during the index pregnancy such as, Malaria and accident/injury were found to be associated with a higher IMR at the Neo-natal and Renal infection, Oedema, Anaemia, Convulsions, German Measles and Palour at the post Neo-natal stage.

With regard to the effect of the anti-natal care received by mothers during the index pregnancy on infant mortality we find a very positive result when timely special

contacts were established with the health workers. In both the Rural and Hilly Population groups the IMR remained low when, during certain complications/problems, contacts were established with Health Guide (128.7 and 111.1), ANM/Nurse (150.0 and 114.0), Health Visitor (94.3 and 73.2) or a Government Doctor (174.6 and 99.0). The full course of three doses of Tetanus toxoid injections and Iron tablets were associated with a low IMR in both the Rural (160.2 and 164.2) and Hilly (111.7 and 123.5) population Groups.

The normal dietary intake of cereals, pulses, fat/oil, eggs and meat/fish by mothers in the rural group and that of cereals, pulses and leafy and other vegetables, milk, fat, oil, sugar/jaggery, eggs, and meat/fish in the Hilly Population Group during pregnancy was found to be associated with a low IMR in our study. A low IMR was also found if mothers during pregnancy, in the Rural Population Group, maintained normal diet (214.6) and did not avoid any food (212.8). In comparison, the IMR was reported to be higher if mothers took extra food (225.0) and avoided certain food (246.9). In the Hilly Group the IMR was low (137.9) if mothers did not take extra food during pregnancy as against those who used to take extra food (250.0). However, in this population group the IMR was low if mothers did avoid certain food (132.7) than those who did not (140.4). This might be due to the climatic conditions that certain food items are avoided in the Hilly area during pregnancy.

The addictive personal habits of mothers during the index pregnancy seems to have had serious impact on the health of children. The infant mortality rate was higher in such cases, in both the Rural as well as Hilly population Groups. Even toddler mortality was found significantly high if mothers had the habit of smoking/chewing tobacco during pregnancy. Loss of weight of mothers during pregnancy also indicate a significant relationship with a high IMR in both the Rural (358.6) and Hilly (374.1) groups. In such cases mortality rate among the toddler group was also higher in both the Rural (59.8) and Hilly (59.7) population.

(ii) Natal Risk Factors : The risk factors for this stage related to the conditions of labour and delivery. We find ^{of} a higher IMR in case/cesarian delivery (Rural 300.8 and Hilly 203.9); delivery in a hospital (Rural 238.1 and Hilly 221.2) than at the home (Rural 212.6 and Hilly 133.3); excessive bleeding before the on-set of labour (Rural 246.5 and Hilly 253.0) or after delivery (Rural 259.0 and Hilly 291.5).

Surprisingly, a very high IMR was found in the Rural group (317.1) when the birth was attended by a government doctor or by a private doctor (235.3) or by a trained Dai (226.5). In the Hilly group, the highest IMR was found when the birth was attended by 'none' (267.6) or when it was attended by a government doctor (212.1). This trend of high IMR, in cases the birth was attended by a doctor, was probably

because of the fact that in rural areas hospitals/doctors are generally contacted when the complications become very serious.

The smaller than usual size of the baby at birth was found to be related to a very high IMR in both the Rural (392.4) and Hilly (344.0) population groups.

Some of the problems/complications experienced by children at birth proved a serious risk to their lives. Infant Mortality Rate was found particularly very high in the Rural group when children suffered from : Cord infection (344.3), Birth injury (342.9) pre-maturity (482.4), low weight (409.7), Cynosis (377.4), Icterus (311.5), Convulsions (490.9), Respiratory distress (354.2), Malformation (428.6), Abdominal distension (252.5) and other illness (529.4).

In the Hilly Population Group the IMR was found very high when the infants suffered from Cord Infection (500.0), Birth Injury (200.0), Prematurity (263.2), Low Weight (254.9), Convulsions (225.8), Respiratory distress (333.3), Poor feeding (205.5), Abdominal distension (302.3) and other unidentified illness (1000.0).

(iii) Post-Natal Risk Factors : The post-natal risks for the new born babies start from the feeding stage. The highest Infant Mortality Rate, in both Rural and Hilly groups, was recorded when no pre-lacteral feed were given to the baby

before breast milk (Rural 397.1 and Hilly 417.7). This proved to be much more fatal to the babies in the Neo-natal stage (Rural 338.2 and Hilly 324.9).

A very high mortality rate was found among the infants who did not receive breast feeding at all (Rural 635.8 and Hilly 549.1). The effect of this aspect of feeding was found to be very serious at the Neo-natal stage as the mortality rate in this category of infants was 592.6 in the Rural and 462.4 in the Hilly Population Group. The trend of the data indicate lower IMR in cases children were breast fed for a longer duration. This possibly indicates that the breast feeding for longer duration protects children against various infections through supplementary food. However, supplementary food at appropriate age is also essential for the healthy growth of children and therefore, the late introduction of such foods was found to be associated with a higher IMR.

Immunisation of the infants against certain serious diseases had a very positive effect on their survival. The IMR among the infants who had BCG dose (Rural 141.5 and Hilly 14.4), three doses of Polio (Rural 58.8 and Hilly 0.0) and DPT/Tripplc Antegin Vaccines (Rural 20.0 and Hilly 14.1) was very low as compared to those who did not have any doses of BCG (Rural 225.3 and Hilly 163.1), Polio (Rural 236.5 and Hilly 150.0) or DPT/Tripplc Antegin (Rural 227.8 and Hilly 151.5) Vaccines. Maintaining routine contacts or establishing

special purpose contacts with different levels of health personnel for post-natal care of the child has been found to be associated with a significantly low IMR in both the regions of our study.

The general health conditions of children during the first and second six months of their lives had a serious bearing on mortality rates among infants and toddlers. In case of the general health conditions below normal during the first six months the IMR in the Rural group was 525.4 and in the Hilly 392.9 while in case of above normal health conditions the IMR was 350.8 in the Rural and 457.1 in the Hilly Population Group. The IMR was 449.7 in the Rural and 200.0 in the Hilly Group in case the conditions of general health of infants during the 7th and 12th months were below normal while in case of above normal health conditions the IMR in the Rural group was 258.1 and in the Hilly group 173.2.

Over half of the children (58.5 per cent) born in the Rural Sample and 18.36 per cent in the Hilly areas suffered from one or the other serious illness such as various types of fevers, coughs, digestive and nervous disorders, circulatory ailments and others (including jaundice, tetanus, measles, diabetes, malnutrition, accident/injury). The highest IMR was found among those who suffered from the ailments under the category of others (Rural 583.5 and Hilly 563.6) followed by circulatory ailments in the Rural (408.2) and

Nervous disorders in the Hilly (428.6) group. The IMR among those in the Rural group who suffered from coughs (361.3) and Nervous disorders (319.2) was also very high. In the Hill group the IMR was also significantly higher among the children who suffered from coughs (360.0), circulatory ailments (285.7), fevers (222.3) and digestive disorders (210.1). The mortality rate among the toddler group who suffered from circulatory (98.0) and other 97.5 ailments in the Rural population was also found significantly high. Gain in Weight, either below or above normal, during the first year of the child's age has been found associated with very high IMR in both the population groups.

The effect of malnutrition on mortality among infants and toddlers was found very serious in both the rural and the hilly population groups. The effect of this deficiency was highly serious on children in the post-neo-natal stage. Mortality among toddlers was also found to be significantly high. The highest IMR in the Rural group was found in case children had swelling on face and feet (511.6) followed by an IMR 492.3 in case of absence of muscles under skin, 481.8 if they developed Pale skin/mucus membrane, 471.1 if discolouration/loss of hair, 426.5 if breading of ribs and 247.5 if frequent colds and infections occurred. In the Hilly group the highest IMR was found if children suffered from absence of breading of muscles under skin (333.3) followed by an IMR of

300.0 in case of breaching of ribs, 272.7 in case of swelling on feet and face, 225.8 in case of pale skin/mucus membrane, 156.0 in case of frequent colds and infections and 150.4 in case of discolouration/loss of hair.

Our enquiry into the role of mass media on the IMR does not indicate its effectiveness in reducing the IMR by providing useful information to the population on usual health problems of children.

(iv) Socio-Economic Risk Factors : A majority of the currently married women in the sample households (68.29 per cent) of the Rural population group were married at the early age of upto 15 years as against only 17.16 per cent of women in the Hilly group. More than half of the women in the Hilly group (55.71 per cent) were married in the age of between 16-18 years as against 23.22 per cent of women in the Rural group. Literacy in the Rural population group was also significantly lower in comparison to the Hilly group as the percentage of illiterates, among males (55.33) and females (73.72) was much higher as compared to the Hilly group (Males 31.51 and Female 57.10). The percentage of persons educated at the 'matric and above' level in the Hilly group (Males 21.17 and Females 5.37) was significantly higher than in the Rural group (Males 9.51, Females 2.96).

The trend with regard to the relationship between parents' education and infant mortality indicates a higher IMR if neither of the parents were educated (Rural 234.6, Hilly 156.5). In comparison, the IMR was lower in both the Rural sample (183.04) and in the Hilly group (154.69), if both the parents were educated.

The families with larger number of children had lower IMR than the families with smaller number of children. For example, the IMR in the families with upto two children was 332.04 in the Rural group as against 155.79 if the number of children exceeded two. Similarly in the Hilly population group the IMR in the families with upto two children was 171.0 as against 123.16 where the number of children was more than two.

Further, there was an indication that the presence of elderly persons (parents/grand parents) in the family was associated with a lower IMR (Rural 207.2 and Hilly 140.6). The households where there were no elderly persons the IMR was 218.31 in the Rural and 141.40 in the Hilly groups.

In the sample households, Hindus in the Rural (218.8) and Christians in Hilly (500.0) group had the highest IMR. The Scheduled Castes in Rural (231.6) and the Scheduled Tribes in the Hilly group (200.0) had the higher IMR as compared to 'other' castes (Rural 208.5 and Hilly 138.6).

The relationship between the size of agricultural landholdings and the IMR indicate that the infant mortality was highest in the families of big farmers in the Rural (250.0) and small farmers (200.0) in the Hilly group. In comparison, families of the small farmers in the Rural (192.4) and that of the marginal farmers in the Hilly (120.0) group had the lowest IMR. Thus, the relationship between two variables, the landholdings and the IMR suggest that the size of agricultural landholding had no significant bearing on the infant mortality.

On the other hand the ownership of milch cattle and poultry birds have shown a negative relationship with infant mortality in both the Rural and Hilly groups. The household without them had the highest IMR : The IMR was 240.92 in the rural and 159.89 in the Hilly if the households had no milch cattle as against 204.78 in the Rural and 118.72 in the Hilly group if they had more than two animals. The IMR in the families without poultry birds was 215.06 in the Rural and 147.39 in the Hilly while it was 184.21 in Rural and 80.0 in the Hilly group if they had more than five birds. It seems the possession of milch cattle and poultry birds was probably helping more in maintaining the health of the members of the household than supplementing their income. This is substantiated from the analysis of data on IMR in relation to ownership of a kitchen garden where we did not find any positive effect of a kitchen garden on the IMR.

Some of the conditions of housing indicate their adverse effect on the survival of infants. We find a common trend of highest IMR, in both the Rural and Hilly population groups, in case the families were residing in kutchha houses (Rural 220.8 and Hilly 302.9), with insufficient ventilation (Rural 232.0 and Hilly 191.8), severe smoke inside their dwellings (Rural 285.7 and Hilly 220.1), open latrine (Rural 220.5 and Hilly 141.8), and place of garbage disposal near their houses (Rural 228.4 and Hilly 147.1).

The most important and direct indicator of the economic and social status of a family is the income it derives through different sources. We find that the families of artisans in the Rural group (277.8) and of the wage labour in the Hilly group (165.5) had the highest IMR, while those earning through business in both the Rural (103.5) and the Hilly groups (74.6) had the lowest IMR. The highest IMR among the artisan families in the Rural and wage labour in the Hilly groups may possibly due to employment of women in these occupations. It was probably due to this characteristics that mortality rate at the post Neo-natal stage was found much higher than at the Neo-natal stage.

The families with lowest monthly earnings of upto Rs.500/- had the highest Infant Mortality Rate in both the population groups (Rural 255.8 and Hilly 222.8). Similar

was the trend in relation to the monthly household expenditure in the Rural group where the IMR was 258.45 in the families spending upto Rs.500/- per month. However, in the Hilly group the highest IMR (205.88) was found in the families spending between Rs.1001-2000 per month. The relationship between monthly household expenditure and infant mortality in the Hilly group, therefore, does not correspond to the pattern of IMR found in relation to the monthly household income. We did not go into the reasons of this discrepancy in our study.

(v) Fertility Behaviour : The relationship between infant mortality and the fertility behaviour of the sample population was also examined. We find a higher IMR when mothers became pregnant after the birth of the index child (Rural 237.7 and Hilly 258.4) than among those who did not (Rural 211.5, Hilly 133.6). Those who felt it necessary to have a child in place of the one that dies within a year of life were associated with a higher IMR (Rural 265.9, Hilly 160.5) than those who did not think so (Rural 186.4 and Hilly 126.5). The responses of those who did not prefer any method of family planning were associated with an higher IMR (Rural 222.2 and Hilly 176.5) than those who expressed preference for one or the other methods. The desire for having just one child in the family was found associated with the lowest IMR in both the Rural (73.2) and the Hilly (116.3) groups while

desiring to go for two in the Rural (245.9) and those desiring for three in the Hilly group (152.3) were found associated with the highest IMR. In order to ensure that the desired number of children should survive, those in the Rural group who considered it necessary to have more children, had experienced a significantly higher infant mortality in their families (258.7) than those who did not consider it necessary (169.8). In the Hilly population group, however, there were no significant differences in respect of the relationship between infant mortality and the desire for a larger number of children.

(B) Implications

Infant Mortality is the result of a number of factors. Some of them can be identified as high risk factors while others may be supplementing different factors and enhancing the risks. In the first category the risks are independent while in the other are collaborative. According to the present study the largest state of the country, i.e. Uttar Pradesh has an Infant Mortality Rate of 191.2 (213.9 in Rural and 141.3 in the Hilly areas). Some of the risk factors in the state are likely to be different from other areas of the country because of diverse reasons, the most important of them being the conditions of overall development in the state; the extent of availability of the infrastructure; and, the level of fertility.

The poor economic and environmental conditions, the awareness about the facilities available for taking precautionary and remedial measures and the desire in the population to avail them at appropriate stage are also significant factors in reducing or enhancing the risk of infant mortality. The incidence of infant mortality may, therefore, be viewed as the outcome of a complex combination of all such factors as biological, environmental, economic, social and cultural.

Of the 19,991 households considered in the present study covered in 154 villages/clusters of 19 blocks of eight districts of the state, 5,409 mothers were interviewed for an indepth analysis of the risk factors related to infant mortality. This intensive enquiry focussed on factors such as : (a) connected with experience of earlier reproductive life; (b) affecting risk at the time of conception; (c) affecting risk at the time of growth and development of foetus during gestation period; (d) affecting risk at the time of delivery of baby; and (e) affecting risk at the time of growth and development of the infant. Thus, the study covered every aspect related to the incidence of infant mortality.

The findings of the study have significant policy implications. Briefly we mention the following :

- (a) The IMR was lowest in the comparatively developed districts i.e. Etawah in the Western region and

Almora in the Hilly. Taking a clue from this, we believe the overall development of the area will reduce the IMR as in such a case the literacy rate will increase, the appropriate infrastructure including the health and MCH services will improve. This will help in taking precautionary and remedial measures in cases of such maternal ailments/ complications during the period of pregnancy which proves fatal for the infant. Besides, a number of fatal diseases among the infants can be checked at the appropriate time. The availability of sufficient medical and health facilities within reach of the population will automatically generate among the people the desire to avail them. Thus, in short, the overall social and economic development is likely to have crucial impact on the IMR of the State.

- (b) The mass media has not proved itself effective in educating the population even at the level of normal health problems of children. The establishment of an appropriate number of the MCH centres with the responsibility of mass contacts may help in creating awareness among the people. Hence the stress should be on the need of such precautions as :

- (i) the first delivery should not take place before the women attain the age of 19 years;
- (ii) the interval between two births should be about 36 months;
- (iii) maintaining routine contacts with the hospital and immediate check-up and proper treatment in case of complications during pregnancy; and
- (iv) normal dietary intake and avoidance of addictive personal habits during the period of pregnancy.

The study has found that the IMR was lowest if the above mentioned conditions were maintained. There is also a great need of providing appropriate facilities for treatment of certain fatal diseases of the new-born babies at these centres.

- (c) Malnutrition among the pregnant mothers and the infants had a serious adverse effect on the survival of children. The programme of distribution of nutritional food among the economically weaker group has to be expanded and properly maintained.
- (d) The MCH centres may also play a significant role in educating the people about the consequences of their fertility behaviour, desiring for a large number of children and the necessity of breast feeding for a sufficient period.

- (e) The immunisation of pregnant mothers and infants should be augmented and the people should be made aware of its necessity.
- (f) There is a great need of implementing more effectively the law pertaining to the age at marriage as a large majority of women in the Rural group were married at the age of upto 15 years and in the Hilly group at the age of upto 18 years.
- (g) A massive programme of public education will help in reducing the IMR if the people are made aware of the necessity of :
 - (i) appropriate age at marriage, sufficient gap between two births and having a small number of children who can be properly brought-up;
 - (ii) literacy among males and females both;
 - (iii) keeping their houses clean, properly ventilated, avoiding indoor smoke if they don't have a separate kitchen, and disposing of the garbage in the open space, away from their houses;
 - (iv) maintaining the area in their neighbourhood clean and insects-free; and
 - (v) breast feeding to the child for a long a duration as possible.
- (h) The nutritional needs of the poorer pregnant mothers should be properly attended to under the integrated Child Development Scheme. This may help in minimising premature births.

(C) Concluding Observation

The present study covered such a large size of sample which no other study had covered earlier. This lends considerable relevance to the findings. Based on the responses of people belonging to all regions of the state representing about 82 per cent of the total population it indicates broad and general directions of the policy formulations.

In the light of the above it is desirable to conduct an action research in a longer span of time. This may be taken up by adopting one of the weakest blocks from the Hilly and the Rural areas each. The risk factors identified through the present study may be checked by improving the existing conditions over a period of atleast three years. From the second year of introducing of these changes the conditions of infant mortality should be studied in relation to the risk factors identified in the present study. Such a study will provide us an opportunity to test (a) whether the identified risk factors were independent as their elimination/minimisation would reduce the IMR considerably; and (b) whether in the absence of these risk factors some relatively insignificant factors become significant or some new ones crop-up to increase the IMR.

Annexure I

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